

Chapter 4: Fish Advisories, Program Updates, and Monitoring Schedule

4.1 Fish Consumption Advisories

As far back as 1976, NJDEP instituted a comprehensive program to survey possible contamination of fish and shellfish in New Jersey waters. Although some contaminated fish and shellfish species in certain drainages have been identified (See Tables 4.1a,b below) most fish species and waterways in New Jersey do not have fish consumption advisories. Original efforts (Belton 1982) evaluated a broad spectrum of fish including species of recreational and commercial importance as well as species used as ecological indicators. Sampling locations included all major drainage basins, locations containing known or suspected sources of PCB contamination or locations important to recreational and commercial fisheries. These initial results showed PCB contamination to be present only in certain species of fish with fatty edible tissue (e.g., striped bass, bluefish, American eel) whereas other important recreational and commercial foodfish were not contaminated (e.g., summer and winter flounder, weakfish, smallmouth and largemouth bass, perch, carp, etc.). Saltwater and migratory species (e.g., eel) tended to have higher concentrations than freshwater species. In addition, most waterways of the state did not have contaminated fish whereas certain geographical areas with a few species showed levels of concern apparently due to localized sources. Subsequent monitoring activities were then targeted at these species and drainages.

This comprehensive approach followed by intensive localized monitoring was used again in the late 1980s when dioxins in fish became an environmental and health concern (Belton 1985), as well as, in the 1990s when mercury in finfish was discovered and health advisories posted (NJDEP 1994). In general, concentrations of various persistent chemical contaminants are often highest in animals at the top of the food chain (e.g., apex fish and wildlife species), and fish from a number of sites around the state have been shown to contain contaminant concentrations above both federal and/or state thresholds. Identification of these findings prompted NJDEP and the Department of Health and Senior Services to issue health advisories on the consumption of several species of fish throughout the state targeted at specific waterways. Some species which are migratory (e.g., American eel) that pick up PCBs downstream in urban areas and then migrate upstream were given “Statewide” consumption advisories (i.e., even though fish were only analyzed from the estuaries) to conservatively protect fishermen/consumers upstream even though the contamination did not necessarily reflect local sources or conditions of water quality. These advisories are routinely listed at the NJDEP Website (i.e., www.state.nj.us/dep/fgw) and in the New Jersey Fish and Wildlife Digests (NJDEP 2000a and NJDEP 2000b).

From the perspective of “fishable waters,” some of these listed waterways may have fish perfectly suitable for recreational purposes (i.e. based on Fish and Game Rules: (NJDEP 2000a and b), and/or safe to eat (i.e., based on health advisory information: NJDEP 2000a and b), or contaminated but subject to common catch-and-release programs. Tolerant species such as carp may live in degraded waters at safe levels of contamination and therefore satisfy both public health and aquatic life concerns. Individual Fish consumption advisories are listed in Tables 4.1a,b below.

We must recognize that using fish consumption advisories as indicators of local water quality is somewhat problematic. That is, assigning a waterway where contaminated fish may have been

caught (using a sampling/assessment methodology designed to evaluate impacts to consumers) may not be directly correlated with water quality degradation in a specific stream reach. In addition, finfish, within certain limitations, are extremely mobile making associations with sources and causes often tenuous. Also, differing specie physiology and contaminant properties (e.g. only fatty muscle accumulates organochlorides) may result in only certain fish within a waterway presenting public health concerns whereas other fish are completely safe to eat.

NJDEP participates in an Interagency Toxics in Biota Committee (TIBC) that focuses on toxic contamination in fish tissue that may be of concern to human health. As funds are available, NJDEP's Division of Science, Research and Technology conducts research projects to evaluate levels of contaminants in fish, shellfish, and crustacea. As needed, fish consumption advisories are developed through the TIBC to protect human health.

New Jersey is one of 33 states that have enacted fish consumption advisories in response to mercury contamination. These consumption advisories have been issued for species consumed by recreational anglers (chain pickerel and largemouth bass), not commercially available species. Drinking water supplied from the affected waters has been tested and shown to be safe because the mercury resides primarily in sediments and aquatic life.

New Jersey shares jurisdictional waters with New York in the northern watersheds and Delaware/Pennsylvania in the south. Extensive cooperation and peer-reviews between states occurs in data analysis and in the formulation of each state's fish consumption advisories. These primarily affect national estuarine areas (NY-NJ Harbor Estuary and Delaware Estuary). For example in the Delaware Estuary, NJDEP, after reviewing the risk-based consumption advisories developed by Delaware's DNREC, amended its own Fish and Game guidance (NJDEP 2000 a and b) for Delaware Bay waters to reflect the same guidance for Delaware anglers.

In marine waters NJDEP has been instrumental in developing coastwide fish-consumption advisories for bluefish an important recreational/commercial species, which is migratory from Florida to Maine. In 1986, after announcing NJ consumption advisories, NJDEP in conjunction with all the Atlantic States Environmental and Health Departments organized, designed and successfully sought federal funding for a coastwide bluefish study. The study performed by NOAA and EPA showed that contaminated bluefish posed the same consumer risk no matter where they were caught in any Atlantic State jurisdiction. Individual states followed with regulatory risk analyses and consumption advisories consistent with New Jersey's

Application of the results of these studies to designated use attainment must be done with caution due to the following issues:

- Fish tissue monitoring is complex and expensive, hence, studies are often conducted only where fish tissue contamination issues is suspected and commercial or recreational fishing occurs. Therefore, a statewide overview of the magnitude and severity of this problem is not discernable from the data set.
- Fish are mobile animals and may have become contaminated in New Jersey waters or elsewhere.
- Pollution sources may be local (e.g., chlordane) or primarily transported from other states (e.g., mercury).

- Fish consumption advisories include provisions to protect sensitive populations (e.g., pregnant women, nursing mothers, small children).
- Several fish advisories are based on data that are more than 10 years old. A study is underway to collect current data to update and revise these advisories as appropriate.

4.1a Current Status

The Department has issued statewide advisories for American eel, bluefish, striped bass, and American lobster for PCB contamination. Additional advisories in certain areas have been issued for white perch and white catfish for PCBs and blue crabs and shellfish for PCBs and/or dioxin. Table 4.1.1 lists the additional advisories for specific waterbodies. The Department has also issued mercury advisories in freshwater for largemouth bass and chain pickerel. The exceptions include, but are not limited to: Assunpink Creek, Big Timber Creek, Lake Hopatcong, and Cranberry Lake. The complete list of exceptions to this advisory are noted in Table 4.1.2.

Fish consumption advisories that apply to New Jersey waters are summarized in the following Tables 4.1-1 and 4.1-2.

Table 4.1-1: Fish and Crab Advisories Based On PCBs, Dioxin or Chlordane Contamination

LOCATION/ SPECIES	POLLUTANT	ADVISORY/PROHIBITION	
		General Population	High Risk Individual ¹
<i>NEW JERSEY-STATEWIDE</i>			
Note: local advisories may be more specific for the same species.			
American eel	PCBs	do not eat more than once a week	do not eat☐
Bluefish (over 6 lbs.)	PCBs	do not eat more than once a week	do not eat
Striped bass*	PCBs	consumption advisories vary by area; see below	consumption advisories vary by area; see below
American lobsters	PCBs	do not eat green glands (hepatopancreas)	do not eat green glands
<i>NEWARK BAY COMPLEX</i>			
Newark Bay, Hackensack River downstream of Oradell Dam, Arthur Kill, Kill Van Kull, tidal portions of all rivers and streams that feed into these water bodies.			
Striped bass*	PCBs/Dioxin	do not eat	do not eat
American eel	PCBs	do not eat more than once a week	do not eat
Blue crab*	PCBs/Dioxin	do not eat or harvest ²	do not eat or harvest ²
Bluefish (over 6 lbs.), white perch, white cat fish	PCBs	do not eat more than once a week	do not eat
<i>NEWARK BAY COMPLEX</i>			
Passaic River downstream of Dundee Dam and streams that feed into this section of the river.			
all fish and shellfish*	Dioxin	do not eat	do not eat
Blue crab *	PCBs/Dioxin	do not eat or harvest ²	do not eat or harvest ²

LOCATION/ SPECIES	POLLUTANT	ADVISORY/PROHIBITION	
		General Population	High Risk Individual ¹
<i>HUDSON RIVER</i>			
Hudson River includes the river downstream of NY-NJ border (about 4 miles above Alpine, NJ			
American eel *	PCBs	Do not eat more than once a week	Do not eat
Striped bass *	PCBs	Do not eat more than once a week	Do not eat
Bluefish (over 6lbs.) white perch and white catfish	PCB	Do not eat more than once a week	Do not eat
Blue crab	PCBs/Dioxin	Do not eat green gland (hepatopancreas) ³	Do not eat green gland ³
<i>RARITAN BAY COMPLEX</i>			
This complex includes the New Jersey portions of Sandy Hook and Raritan bays, the tidal portions of the Raritan River (downstream of the Rte. 1 bridge in New Brunswick) and the tidal portions of all rivers and streams that feed into these water bodies.			
Striped bass *	PCBs	Do not eat more than once a week	Do not eat
Bluefish (over 6 lbs.), white perch and white catfish	PCBs	Do not eat more than once a week	Do not eat
Blue crab	PCBs/Dioxin	Do not eat green gland (hepatopancreas) ³	Do not eat green gland (hepatopancreas) ³
<i>NORTHERN COASTAL WATERS</i>			
This area includes all coastal waters from Raritan bay south to the Barnegat Inlet.			
Striped bass *	PCBs	Do not eat more than once a week	Do not eat
<i>CAMDEN AREA</i>			
This area includes Strawbridge Lake, Pennsauken Creek (north and south branches), Cooper river and its drainage, Cooper River Lake, Stewart Lake and Newton Lake.			
All fish, shellfish and crustaceans *	Chlordane	Do not eat	Do not eat

LOCATION/ SPECIES	POLLUTANT	ADVISORY/PROHIBITION	
		General Population	High Risk Individual ¹
<i>LOWER DELAWARE RIVER & BAY</i>			
Delaware River from Yardley, PA to the PA/DE border			
American eel	PCBs, Chlordane	Do not eat	Do not eat
<i>LOWER DELAWARE RIVER & BAY</i>			
Delaware River from Yardley, PA (across from Ewing Twp., NJ) south to the Chesapeake and Delaware Canal			
Channel catfish *	PCBs,	Do not eat	Do not eat
White catfish	Chlordane	Do not eat	Do not eat
White perch		Do not eat	Do not eat
<i>LOWER DELAWARE RIVER & BAY</i>			
Lower Delaware River includes the river between the PA Turnpike Bridge (I-276 bridge) in Burlington Twp. (Burlington County) and Birch Creek in Logan Twp. (Gloucester County about 2 miles below Commodore Barry Bridge			
Channel catfish *	PCBs, Chlordane	Do not eat	Do not eat
Lower Delaware River & Bay			
Delaware River from the DE/PA border south to the Delaware and Chesapeake Canal			
Striped bass *	PCBs	Do not eat	Do not eat
Lower Delaware River & Bay			
Delaware River from the Chesapeake and Delaware Canal (across from Salem, NJ) south to mouth of the Delaware Bay			
Striped bass *	PCBs	Do not eat more than five 8-ounce meals per year	Do not eat more than 3 4- ounce meals per year
Channel catfish			
White catfish			

* Selling any of these species from designed water bodies is prohibited in New Jersey.

¹ High-risk individuals include infants, children under the age of 15, pregnant women, nursing mothers and women of childbearing age. They are advised not to eat any such fish or crabs taken from the designated regions since these contaminants have a greater impact on the developing young.

² No harvest means no taking or attempting to take any blue crabs from these waters.

³ Interim recommendation based on research showing elevated levels of chemical contaminants in the blue crab hepatopancreas also called the green gland.

Table 4.1-2: Consumption Advisories for Mercury for Largemouth Bass and Chain Pickerel from New Jersey Freshwaters

Location	Species	Advisory + General Population	Advisory + High-Risk Individual*
New Jersey Statewide			
For all freshwater bodies (except those listed below)	Bass and pickerel	do not eat more than once a week	do not eat more than once a month
Pinelands Area			
For all water bodies (except those listed below)	Bass and pickerel	do not eat more than once a month	do not eat
Site-Specific Pinelands			
Lake Lenape	Bass Pickerel	do not eat more than once a week do not eat more than once a week	Do not eat do not eat more than once a month
Mirror Lake	Bass Pickerel	No restrictions No restrictions	do not eat more than once a month do not eat more than once a week
Stafford Forge	Bass Pickerel	do not eat more than once a month do not eat more than once a week	Do not eat Do not eat
Wading River	Bass Pickerel	do not eat more than once a month do not eat more than once a week	Do not eat Do not eat
Site-Specific Statewide			
Assunpink Creek	Bass Pickerel	No restrictions Do not eat more than once a week	Do not eat more than once a week Do not eat more than once a month
Atlantic City Reservoir – No Fishing Allowed	Bass Pickerel	Do not eat Do not eat	Do not eat Do not eat
Big Timber Creek	Bass Pickerel	No restrictions do not eat more than once a week	do not eat more than once a week do not eat more than once a month
Canistear Reservoir	Bass Pickerel	do not eat more than once a week do not eat more than once a week	Do not eat Do not eat more than once a month
Clinton Reservoir	Bass Pickerel	do not eat more than once a week do not eat more than once a week	do not eat do not eat more than once a month
Cranberry Lake	Bass Pickerel	do not eat more than once a week No restrictions	do not eat more than once a month do not eat more than once a month
Crosswicks Creek	Bass Pickerel	No restrictions do not eat more than once a week	do not eat more than once a week do not eat more than once a month
Crystal Lake (Burlington County)	Bass Pickerel	No restrictions Do not eat more than once a week	do not eat more than once a week do not eat more than once a month
Delaware River (Easton to Trenton)	Bass Pickerel	No restrictions Do not eat more than once a week	do not eat more than once a month do not eat more than once a month
Delaware River (Trenton to Camden)	Bass Pickerel	No restrictions do not eat more than once a week	do not eat more than once a week do not eat more than once a month
Lake Carasaljo	Bass Pickerel	do not eat more than once a week No restrictions	Do not eat do not eat more than once a month

Location	Species	Advisory + General Population	Advisory + High-Risk Individual*
Lake Hopatcong	Bass Pickerel	No restrictions No restrictions	do not eat more than once a month do not eat more than once a month
Manasquan Reservoir	Bass Pickerel	do not eat more than once a month do not eat more than once a week	Do not eat do not eat more than once a month
Merrill Creek Reservoir	Bass Pickerel	do not eat more than once a week do not eat more than once a week	Do not eat do not eat more than once a month
Monksville Reservoir	Bass Pickerel	do not eat more than once a week do not eat more than once a week	Do not eat Do not eat more than once a month
Rockaway River	Bass Pickerel	do not eat more than once a week No restrictions	Do not eat more than once a month Do not eat more than once a month
Round Valley Reservoir	Bass Pickerel	No restrictions do not eat more than once a week	do not eat more than once a month do not eat more than once a month
Shadow Lake	Bass Pickerel	No restrictions do not eat more than once a week	do not eat more than once a week do not eat more than once a month
Spruce Run Reservoir	Bass Pickerel	No restrictions do not eat more than once a week	do not eat more than once a month do not eat more than once a month
Swartwood Lake	Bass Pickerel	Do not eat more than once a week No restrictions	do not eat more than once a month do not eat more than once a week
Union Lake	Bass Pickerel	do not eat more than once a month do not eat more than once a month	Do not eat Do not eat
Wanaque Reservoir	Bass Pickerel	do not eat more than once a week do not eat more than once a week	Do not eat Do not eat
Wilson Lake	Bass Pickerel	do not eat more than once a week do not eat more than once a week	Do not eat more than once a month Do not eat
Woodstown Memorial Lake	Bass Pickerel	No restrictions do not eat more than once a week	do not eat more than once a month do not eat more than once a month
<p>Notes: + One meal is defined as an eight-ounce serving.</p> <ul style="list-style-type: none"> • High risk individuals are pregnant women, women planning pregnancy within one year, nursing mothers and children under five years old. • The Bound Brook and New Market Lake became contaminated from releases of the Cornell Dublier Electronics Superfund Site, located about one-mile upstream of the lake, resulting in contaminated sediments and fish. In 1997, the Department issued a ban on consumption of any fish from the Bound Brook and New Market Lake. The ongoing remediation of this site is being managed by the USEPA. 			

Data Development and Risk Assessment Needs

As stated above, state issued advisories relative to PCB's and chlorinated pesticides are based on data that are over five years old and fish tissue contamination data have not been collected from all waterbodies or species that are consumed by New Jersey recreational and commercial anglers. Funding to address these data gaps and routinely update advisories as needed has not been available for several years. In FY 1999 and FY 2000, a one-time special NJ investigation of chemical contamination in the state's fisheries will be performed including those marine and estuarine fish, shellfish, and freshwater fish under current fish consumption advisories. The results of this study will be used to update existing advisories or if necessary develop new advisories. In addition, the data generated will also assist the NJDEP to evaluate trends in contaminant concentrations of these selected species. In concordance with this status and trends

monitoring, a stable source of funding should be identified to support this important public health and aquatic life indicator.

Development of a more comprehensive health assessment of contaminants in fish species that are consumed by New Jersey anglers is a significant risk assessment need. Recent data from EPA on new risk factors for some chemicals of concern as well as the use of Toxic Equivalent Factor (TEQ) approaches towards assessing cumulative risk from more congeners of PCBs and dioxins may be indicated.

Several environmental factors influence patterns of chemical bioaccumulation, including the age, lipid content, species of fish and a variety of water quality parameters (e.g., pH, dissolved organic carbon, calcium, etc.). Improved understanding of how these factors interplay will enhance our ability to predict spatial patterns of contamination, and thus the development of appropriate advisories and contaminant management measures.

Identifying Sources of Chemical Contamination

The results of ongoing studies will be used to evaluate the basis for existing fish consumption advisories, evaluate risks associated with contamination, and identify sources of toxic contamination. Efforts to address significant data gaps will be conducted, as resources become available. There are numerous suspected sources of toxic chemicals that bioaccumulate in fish and shellfish, including historical and current sediment contamination, air deposition, combined sewer overflows, municipal stormwater, agricultural -runoff and various point source discharges. In order to reduce contamination in fisheries and therefore reduce the need for consumption advisory levels, environmental contamination must be reduced. Identification of specific sources of toxic contamination and data regarding the relative contribution of each source is the first step toward appropriate management.

During the process of posting fish advisories, NJDEP continuously looks for localized or downstream sources of contamination. In both the Delaware Estuary and the Harbor Estuary Programs, NJDEP is currently developing Pilot Studies for Source Trackdown using GIS-based data searches (Belton and DeFina 2000) and bald eagles (Niles et al. 2000) as bioindicators of PCB contamination. In other waters, NJDEP also participates in the trackdown of un-permitted discharges of contaminants in conjunction with the Department's land use regulation program (e.g. CSO Sampling workplans, enforcement follow-up, etc.).

Air deposition is a likely source for significant loads of some bioaccumulative contaminants (e.g., mercury, PCBs, etc.). To investigate and track these sources, NJDEP has established the New Jersey Atmospheric Deposition Network (NJADN) through Rutgers University to monitor nine stations statewide for air toxics. These data will support evaluation of multi-media transport mechanisms useful in understanding certain sources of bioaccumulation (e.g., a major sources of mercury causing NJ fish advisories are coal fired power plants in the Ohio River valley). To address these sources, NJDEP is participating in litigation to reduce stack emissions of metals from these out-of-state power plants. NJDEP also organized an *Air-Water Deposition Workshop* held in April of FY 2000 to review existing air-water data and to address how these data can be used to develop air-water science-based management strategies (report due out in Fall 2000). It was noted that water-based TMDLs supply a mechanism to limit permitted sources to

waterbodies and that the Clean Air Act's "Great Waters Program" allow agencies to seek regulatory action against air emission sources through stack permit/controls if links are found between the two media. In addition, NJDEP is participating in multi-state TMDL modeling efforts (i.e., DeLEP and HEP) to link hydrological transport models with air, water, and sediment data inputs and with subsequent outputs to a food chain transport model (i.e., bioaccumulation).

Maintaining and Improving Aquatic Life and Addressing Public Health Concerns

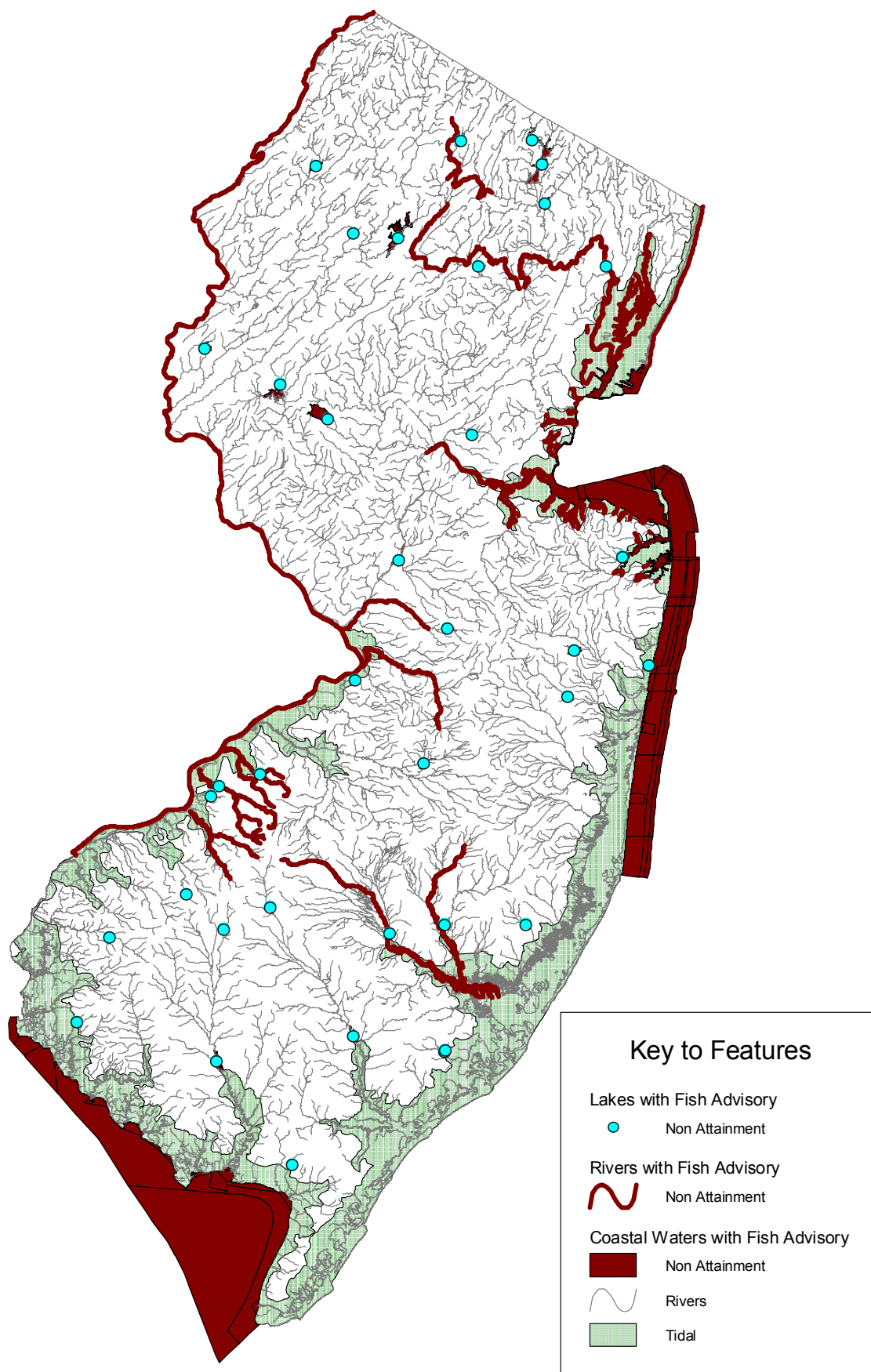
Improve the basis for fish consumption advisories: New bioaccumulation data sets will be developed based on recent sampling events to evaluate the status of existing advisories. Additional studies of fish and shellfish population data, water/sediment chemistry will be collected and collated to evaluate/improve sampling study designs, update advisories and provide public education:

Continue to monitor for sources: NJDEP is currently developing Pilot Studies for Source Trackdown using GIS-based data searches and bald eagles and bioindicators for bioaccumulated contaminants. NJDEP will also participate in the trackdown of un-permitted discharges of contaminants in conjunction with the Department's land use regulation program (e.g. CSO Sampling workplans, enforcement follow-up, etc.).

Monitor and assess air deposition sources: Air deposition is a likely source for significant loads of some bioaccumulative contaminants (e.g., mercury, PCBs, etc.). To investigate and track these sources, NJDEP has established the New Jersey Atmospheric Deposition Network (NJADN) to evaluate air data to support evaluation of multi-media transport mechanisms useful in understanding certain sources of bioaccumulation. In addition NJDEP is participating in multi-state TMDL modeling efforts (i.e., DeLEP and HEP) to link hydrological transport models with air, water, and sediment data inputs and with subsequent outputs to a food chain transport model (i.e., bioaccumulation).

Stable sources of funding: Funding to address data gaps and routinely update fish consumption advisories has not been available for several years. In fiscal year 1998 a one-time special NJ appropriation was established for NJDEP allowing a selective reassessment via new monitoring in FY1999 and FY2000. A continuous stable source of funding to maintain the State's monitoring of fish and waterways impacted by consumption advisories should be established.

FIGURE 4.1-1. Fish Consumption Advisories in Rivers, Lakes, Estuarine, and Ocean Waters.



4.1b New Jersey Mercury Task Force

The Department convened its first Mercury Task Force in 1993. This Task Force recommended a stringent reduction in mercury emissions from municipal solid waste (MSW) incinerators, which were subsequently implemented by NJDEP and resulted in a 90 percent reduction from this source category. The second Task Force convened in 1998, triggered by a concern that additional significant sources existed and that energy deregulation would increase the mercury emissions from Midwestern power plants potentially resulting in increased mercury deposition in New Jersey.

The task force report indicates that air deposition (wet and dry) is the most significant source of environmental mercury followed by water born sources such as point source discharges of wastewater, nonpoint sources such as septic tank leachate, and sludge application.

The 1998 Mercury Task Force advocated a long range goal of the virtual elimination of anthropogenic sources of mercury. Towards this goal, a two step milestone of a 75% reduction in air emissions below estimated 1990 levels by 2006 and an 85% reduction below 1990 levels by 2011 was recommended. The Task Force reviewed all local and regional mercury sources and New Jersey is looking for reductions in all sources as practicable. New Jersey expects this effort to result in the attainment of water quality standards given the scientific and quantitative basis of the current recommendations combined with the successful track record of the implementation of the primary recommendation of the first Mercury Task Force.

New Jersey expects the implementation of these recommendations will make large contributions to reducing mercury uses and emissions and this will in turn lead to reductions in mercury body burdens in fish. Evidence from studies conducted in Florida indicate that reducing air emissions can lead to reductions of mercury in fish tissue over a relatively short time period.

The broad range of recommendations made by the task force include both enforceable and voluntary actions. Of enforceable actions, New Jersey is in the process of implementing Task Force emission reduction recommendations for new emission rules for iron and steel manufacturing, coal combustion, medical waste incineration, hazardous waste incineration and additional controls on municipal solid waste incineration. New Jersey is also reviewing its enforcement policy regarding emission limits already in effect pursuant to permits for individual iron and steel manufacturing facilities.

In addition, the Task force recommended that the Department develop and improve environmental indicators of the impact of mercury on New Jersey's environment including measures that can be used to determine over time the effectiveness of additional emission reduction efforts. Other measures implemented by the Department in response to the Task Force include the following:

- The Department is currently expanding routine monitoring for mercury in fish from New Jersey waters and identifying stable funding source to maintain the network.
- The Appliance and Vehicle Mercury Switch Removal Project, currently underway, will use an EPA grant, financial and in-kind contributions from the automobile recycling, and shredding industries to do a pilot project to investigate the effort of removing mercury

switches from autos and recommending how to develop a regional system for removing mercury switches from the recycled metals stream.

- The Department is developing a mercury outreach and reduction program targeted at the general public regarding the use and proper disposal/recycling of mercury-containing products and their environmental impacts.

The Report of the Mercury Task Force can be viewed on the web at http://www.state.nj.us/dep/dsr/mercury_task_force.htm

The Department initially assigned waters with mercury advisories to Sublist 4B of the Integrated List in its Draft for public notice in May of 2002. In the Department's view, these lakes do not require TMDLs because other pollution control requirements, specifically the implementation of selected Mercury Task Force Recommendations, are reasonably expected to result in attainment of water quality standards. After much discussion with EPA, New Jersey has moved these waters to Sublist 5 with a low priority ranking. The Department will wait for an EPA-sponsored national mercury policy before reconsidering its listing policy regarding mercury advisories and their placement on the Integrated List.

Section 4.2a: Progress In Watershed Restoration And Protection

Introduction

This section describes some of the activities and progress being made to restore and protect water quality in New Jersey by the Department. Towards the goal of water management, the Department maintains several programs including the Watershed Management Program, the Green Acres Program, the Environmental Infrastructure Program and the Section 319(h) grant Program. The ultimate goal of watershed management is to provide comprehensive watershed management that will address water resources issues and protect water quality, water quantity and ecosystem health.

The *Watershed Management Program* address this process through stakeholder groups that develop a shared vision of the watershed, assess current conditions and water quality, delineate goals, and develop and implement strategies to meet these goals. *The Green Acres Program* acquires land for recreation, open space and conservation. Between July 1, 1999 and June 30, 2002, the Green Acres Program acquired 58,650 acres. The *Environmental Infrastructure Program* also provides loans to acquire lands to protect water resources. This program funded the acquisition and protection of an additional 2,028 acres. While these funding sources focus on protecting water quality, the Department utilizes *Section 319(h) grants* to restore water quality. Section 4.2a provides detailed descriptions of these four programs and delineates projects funded through these efforts.

Watershed Management Program

As stated earlier, the ultimate goal of watershed management generically is to provide a comprehensive watershed management plan for each of 20 Watershed Management Areas (WMA) (see Figure II-1, in Part II of this Report) that will, at a minimum, identify strategies to address watershed restoration and management to protect water quality, water quantity and ecosystem health.

The formal Watershed Management Program itself accomplishes this through the efforts of diverse stakeholder groups by developing a shared vision of the watershed, assessing current conditions and water quality, delineating goals, and developing strategies to meet these agreed upon goals, then implementing the strategies. Currently, through the Program, the watershed management process is taking place in all 20 WMAs of the state. The overall effort relies upon measurable goals and objectives and indicators of success. Through the Watershed Management Process, criteria for Open Space acquisition to protect water resources have been developed.

A note on terminology; the Watershed Management Program has initiated a series of local activities which are referred to by the terms “**action now projects**” and the “**dot strategy**.” The former represent remediation projects whereby the sources of impairment are obvious and no study or characterization is necessary to identify it. Corrective action can be taken immediately. The latter refers to efforts to determine the source of impairment to the State’s biological monitoring locations (dots on a map) that are assessed as impaired. It is hoped that in some cases the causes of impairment can be identified and corrective action taken to render the impaired sites non-impaired. Another frequently mentioned acronym is “**TMDL**,” which stands for Total Maximum Daily Load. This is an analysis to determine the quantity of a pollutant that can enter a waterbody and not cause a violation of a water quality standard. The analysis is used to determine the relative significance of various pollutant sources to water impairment and develop targets for pollutant reductions.

Within the context of the Watershed Management Program, the Department operates the **Watershed Ambassadors Program** (Ambassadors) through AmeriCorps. The Ambassadors addresses the diverse environmental needs of the State by raising awareness about the status of the State’s watersheds. The program strives to work with all sectors of society to improve the quality of New Jersey’s by exploring the relationships between people and the environment, nurturing community-based environmental activities and empowering residents to make responsible and informed decisions regarding their watershed. The Department has hired 20 AmeriCorps members and assigned each to one of the 20 watershed management areas. Through this program, the members assist the Department in monitoring the rivers of New Jersey through River Assessment Teams (RATS) and Biological Assessment Teams (BATS) volunteer monitoring programs. The members also train community volunteers to assist in these monitoring programs. Through audio-visual presentations, the members provide information and education to community organizations and schools, in order to have an informed citizenry about water and watershed issues in New Jersey.

Watershed Management Area 1

The Upper Delaware Watershed Management Area includes portions of Sussex, Morris, Hunterdon and all of Warren Counties and all or parts of 54 municipalities and encompasses 746 square miles. This region lies in the Highlands physiographic province with all streams and rivers flowing toward the Delaware River. Within Area 1 there are 6 major drainage basins: Delaware River, Flat Brook, Paulins Kill, Pequest River, Lopatcong and Pohatcong River Drainage, and the Musconetcong River.

The Education and Outreach Committee developed a list of outreach priorities, identifying municipal officials as the primary target audience. This committee has developed a presentation designed to educate and inform municipal officials about watershed management, a needs assessment protocol to gain a better understanding of the expectations and needs of local stakeholders, educated local stakeholders by participating in various local events throughout the watershed management area, and hosted two successful Watershed Festivals. The Action Now committee developed an evaluation criteria to rank projects for 319 nonpoint source control funding. The committee made recommendations to the Department on each project submitted for funding.

The Open Space and Farmland Preservation Committee has identified a series of needs including the need to open lines of communication among groups working to preserve lands and the need to provide assistance in directing individuals to the right funding sources for land preservation. The committee has prepared maps identifying protected lands and lands targeted for protection in the region, hosted meetings to encourage partnership acquisitions, held a training workshop on coordinating open space plan development for townships and non-profit organizations, developed a funding document, explaining different funding sources in the region that are available for land preservation, sponsored workshops for such topics as: Developing and Implementing Open Space Plans, Partnerships for Land Preservation, Open Space Planning and Implementation. The purpose of the Partnership Preservation workshops was to help groups working on preserving specific parcels of land. They also assisted in the development of a Water Resource Evaluation System GIS model that has been developed as a tool to help prioritize open space acquisition based on a water resource model. Information can be found at the Project's website: www.upperdelaware.org.

Watershed Management Area 2

Area 2 is also known as the Wallkill River Watershed and includes 11 townships in Sussex County. The Wallkill River watershed is unique in that its headwaters begin at Lake Mohowk in Sparta Township and then flows north into New York, eventually emptying into the Hudson River. The Wallkill Watershed is approximately 185 square miles in area, and is comprised of a variety of land uses including rural and centralized residential development, agriculture, commercial, recreational, and industrial usage. Also located within this watershed area is the Wallkill Wildlife Refuge. The refuge watershed/wetlands complex provides migratory and nesting habitats for numerous birds and waterfowl and is home to several endangered species. Major rivers include the Wallkill River, Papakating Creek, Pochuck Creek, Black Creek, Wawayanda Creek, and Lake Lookout Brook. Lakes and ponds in these watersheds include

Lake Mohawk, Newton Reservoir, Beaver Lake, Lake Grinnell, Wallkill Lake, Upper Greenwood Lake, Lake Wawayanda, and Highland Lake.

The Education and Outreach Committee has been actively working on watershed signs and has placed a total of 15 around the county. They have also worked with the Watershed Partnership of NJ to finalize locations for the future placement of State Watershed Boundary Signs. This committee has conducted many educational events such as tours of the SCMUA Wastewater Treatment Facility, for the purpose of raising watershed awareness around the community. In addition, this committee has set up display booths at various events around the county and has assisted in the production of a water conservation brochure. The TAC is working on characterization and assessment issues as well as TMDL strategy development. This committee has developed and implemented a water quality sampling plan for submittal to the Department. The committee played an active role in the development of the document; "Assessment and Approaches to Restore Impaired Waterbodies within the Wallkill River Watershed." A Coordinating Committee has been established to guide the overall process and the decision-making sessions of the PAC and the other committees.

Watershed Management Area 3

WMA 3 is comprised of the Pequannock, Wanaque, Ramapo, and Pompton Watersheds for a total of 238 square miles. The Pequannock, Wanaque, and Ramapo Rivers all flow into the Pompton River, which is a major tributary to the Upper Passaic River. WMA 3 contains 9 surface water reservoirs, including the Wanaque and Monksville Reservoirs, that supply high quality drinking water for more than 2 million New Jersey residents. WMA 3 spans 21 municipalities and lies mostly in Passaic County, but also includes parts of Bergen, Morris, Essex and Sussex Counties.

The WMA has a functioning Public Advisory Committee with by-laws and mission statement and various subcommittees and has adopted a vision with goals and objectives specific to their particular watershed and is in the process of refining the action plans. Open Space Criteria has been ranked based on drinking water source areas and recharge areas. Using these criteria, a GIS map was generated. In addition, legislation was recently passed in New York that mirrors an act passed in New Jersey two years ago, each formally titled the "Greenwood Lake Protection Act." The partnership of these two acts creates a 13-member commission of appointed representatives from both states that will serve to protect the area around Greenwood Lake, which straddles the New Jersey/New York border in the northernmost region of WMA 3. This cooperative effort will not only help Greenwood Lake and the surrounding region, but also pave the way for future cooperative efforts between these two states, which share multiple watershed interests in New Jersey and New York.

Watershed Management Area 4

WMA 4 includes the Lower Passaic River (from the Pompton River confluence downstream to the Newark Bay) and its tributaries, including the Saddle River, Preakness Brook, Second River,

and Third River. The drainage area of WMA 4 is approximately 180 mi², includes portions of five counties (Essex, Hudson, Morris, Bergen and Passaic Counties), and 66 municipalities. Several of the municipalities are older, industrial centers (Newark, Paterson, Clifton and East Orange) and a large portion of WMA 4 is already developed land and consists of impervious cover.

The WMA has a functioning Public Advisory Committee with by-laws and mission statement and various subcommittees and has adopted a vision with goals and objectives specific to their particular watershed and is in the process of refining the action plans. The Technical Advisory Committees proposed existing Water Quality Sites utilizing on-the-ground local knowledge to prioritize for the Department's water quality sampling plan. Open Space Criteria has been ranked based on highly urban areas, including brownfields and environmental justice categories. The mapping criteria is being used to develop GIS map. Currently WMA 4 PAC is reaching out to organizations such as the Friends of the Clark's Pond and Third River, who have been working on "Clark's Pond Nature Preserve". The Township of Bloomfield has dedicated this preserve as an urban refuge consisting of a 7-acre pond and 10 acres of surrounding woodland located on the Third River. This dedication is due to the efforts of this volunteer organization now actively involved the WMA 4 process.

Watershed Management Area 5

WMA 5 is the most populated watershed in New Jersey; it consists of the Hackensack River Watershed, the Pascack Brook Watershed and the Hudson River Watershed. WMA 5 covers 62 municipalities in Hudson and Bergen Counties. Approximately half of WMA 5 is still developable with over thirty percent of WMA 5 is residential development. A unique feature in WMA 5 is the Hackensack Meadowlands, home to more than 265 different species of birds. This 32 square-mile tidal marsh bridges Bergen and Hudson Counties and is governed by the New Jersey Meadowlands Commission.

The Hackensack River by itself drains an area of 202 square miles including Rockland County, New York and parts of Hudson and Bergen Counties. The major impoundments in New Jersey include Oradell Reservoir, Woodcliff Reservoir and Tappan Lake. Above the New York portion of Tappan Lake is DeForest Reservoir belonging to Suez Lyonnaise the owner of United Water of New York (UWNY) and United Water of New Jersey (UWNJ). Water quality and quantity in New York State have a direct impact on New Jersey. Several counties in WMA 5 rely on UWNJ to deliver finished water from the Oradell Reservoir.

The WMA has a functioning Public Advisory Committee with by-laws and mission statement and various subcommittees and has adopted a vision with goals and objectives specific to their particular watershed and is in the process of refining the action plans. The Technical Advisory Committees proposed existing Water Quality Sites utilizing on-the-ground local knowledge to prioritize for the Department's water quality sampling plan. WMA 5 ranked their Open Space Criteria in alignment with the Bergen county Open Space Plan. A GIS map is under development using the Open Space criteria.

Watershed Management Area 6

WMA 6 represents the area drained by waters from the upper reaches of the Passaic River Basin, including the Passaic River from its headwaters in Morris County to the confluence of the Pompton River. WMA 6 is characterized by extensive suburban development and reliance upon ground water sources for water supply. WMA 6 lies in portions of Morris, Somerset, Sussex and Essex counties and includes the Upper and Middle Passaic River, Whippany River and Rockaway River Watersheds. The 7,450 acre Great Swamp National Wildlife Refuge located within the Upper Passaic River Watershed, was the first wilderness area established by the United States Department of the Interior.

The WMA has a functioning Public Advisory Committee with by-laws and mission statement and various subcommittees and each WMA has adopted a vision with goals and objectives specific to their particular watershed and is in the process of refining the action plans. Open Space Criteria has been ranked based on drinking water source areas and recharge areas. Using this criteria GIS maps were generated and are being reviewed for use with the New Jersey Statewide Water Supply Plan. The Department established a TMDL for fecal coliform for the Whippany River Watershed as an amendment to the Northeast Water Quality Management Plan in April 2000. WMA 6 has received over one million dollars in grant funding to reduce nonpoint source pollution within the watershed. The PAC process has been utilized to help prioritize Action Now projects and 319(h) projects which dealt with a variety of issues from stormwater to non point source pollution, well head protection, streambank or shoreline restoration projects and projects specific to reduction of fecal coliform contamination in the Whippany River as part of the required TMDL implementation. The Department provided funding to Hanover Township to improve stormwater quality by increased clean outs of the storm drains. This has lead to dramatic reductions in total suspended solids, phosphorus, nitrogen, and oxygen-demanding materials.

Watershed Management Area 7

Watershed Management Area 7, a 160 square mile urban area known as the Metropolitan Watershed includes the Arthur Kill and its tributaries, the Elizabeth, Rahway and Woodbridge Rivers, Morses Creek, and the Elizabeth Channel. Watershed Management Area 7 includes large portions of Essex, Union, and Middlesex counties.

The overwhelming success of the WMA 7 effort in this region has been the personal relationships that have been established that have allowed sharing of information and partnering on projects when possible to restore and enhance the streams and rivers and all their attributes. The committees formed to recognize that outreach was a powerful tool in establishing and implementing, open space, as vital components in an area where these are often overlooked. Projects focussed on educating citizen that land and water resources are worth restoring and enhancing for a better quality of life for the 1,000,000 residents in this relatively small area.

The characterization/assessment document has been completed. WMA 7 has encouraged the New Jersey Wetlands Mitigation Council to fund mitigation in the watershed. Grant funds have been used successfully in urban stream bank and wetland restoration projects. WMA 7 has encouraged the Army Corp of Engineers to undertake large-scale restorations relating to lost natural resource benefits in the City of Rahway. Finally, A 'Road Salt Reduction' seminar for municipal road and traffic officials was sponsored by the WMA. For the future, the WMA plans to focus on projects related to Phase 2 Municipal Stormwater Management plans.

Watershed Management Areas 8

The North and South Branch Raritan watershed comprises all of WMA 8; encompassing a 468 area of square miles as parts of Hunterdon, Morris, and Somerset counties and 34 municipalities. The Branches join near Branchburg to form the main trunk of the Raritan River. South Branch Raritan River tributaries and lakes include: Round Valley Reservoir, Mulhockaway Creek, Spruce Run, Spruce Run Reservoir, Neshanic River, Drakes Brook, Beaver Brook, Cakepoulin Creek, First Neshanic River, Back Brook, Furmans Brook and Pleasant Run. North Branch Raritan River Tributaries are: Lamington River, Rockaway Creek, Burnetts Brook, Mine Brook, Middle Brook, Tanners Brook, Rockaway Creek South Branch and Chambers Brook.

Watershed Management Areas 9

The Lower Raritan watershed comprises all of WMA 9 and encompasses an area of 352 square miles with parts of Middlesex, Monmouth Somerset, and Union counties and 26 municipalities. Major waterways in WMA 9 include Green Brook, Cedar Brook, Bound Brook, Ambrose Brook, Dukes Brook, Peters Brook, Cuckels Brook, Middle Brook West Branch, Middle Brook East Branch, Mile Run, Mill Brook, Manalapan Brook. Matchaponix brook, Lawrence Brook and the South River.

Watershed Management Areas 10

The Stony Brook-Millstone (WMA 10) watershed comprises an area of 285 square miles with parts of Hunterdon, Mercer, Middlesex, Monmouth and Somerset counties and 16 municipalities. Waterbodies here include the Millstone River, Stony Brook and Carnegie Lake.

WMAs 8, 9 and 10 have focused on plan implementation and prioritization of the major strategy areas identified in the Raritan plan. The Stony Brook Millstone Watershed Association received grant funds to perform a characterization and assessment study of the upper Millstone and Bedens Brook, to develop restoration tools and to develop a River Friendly Program for stream bank stabilization and enhancement. All this marked the beginning of the planning phase for what has come to be known as “The Raritan Basin Watershed Management Project”, or the “Raritan Project”. The Raritan Project has completed its watershed plan for areas 8, 9 and 10. The following reports were completed this calendar year: Surface Water and Riparian Areas;

Ground Water; Landscape; Surface Water Quality and Loadings, and Raritan Basin: Portrait of a Watershed. These join five other technical reports that were generated in previous years, including Water Budget, Water Supply Availability, and a Settings report etc. Additionally, a water resource open space criteria for GIS model was finalized. The TAC is pursuing implementation of a project to design a Protocol to Determine Watershed Based Phosphorus Limits. Two Action Now projects are underway: one focusing on getting retailers to sell phosphorus free fertilizers and a second focusing on a case study of a NPS ordinance.

Watershed Management Area 11

Watershed Management Area 11, known as the Central Delaware Tributaries, effects the drainage in 24 municipalities within the counties of Hunterdon, Mercer and Monmouth. The predominant drainage funnels to the Delaware River or the D&R Canal. Watershed Management Area 11 covers approximately 272 square miles and is dominated by the Assunpink Creek and its tributaries to the south and much smaller creeks in the northern portions. Land uses in this area range from agricultural to urban. Area 11 includes the City of Trenton. The area has also been heavily impacted by suburban development. Population for this area over the past 10 years has greatly increased. Its development has stressed its water resources and impacted water quality. Information is available on the website: www.delawaretribs.org.

The Characterization and Assessment Committee is responsible for guiding the data needs of the Central Delaware Tributaries. This committee has reviewed available data layers for inclusion into a “Settings Report”, and has acted as a technical review board as necessary to complete the work of this project. The “Action Now” Committee is responsible for developing and soliciting “Action Now” nonpoint source projects in the Central Delaware Tributaries.

The Land Use Committee is working on developing the criteria to identify and prioritize open space areas for acquisition within the watershed and land use alternative scenarios. The Education and Outreach Committee has been developing a work plan to set priorities to raise watershed awareness. The group has held a Watershed Hike and has increased public awareness by participating in various events throughout the watershed. The committee is also helping to plan a “Get to Know Your Stream” day to get people into the watershed to learn about their streams and rivers.

Finally, the Regional Planning Partnership has developed a Goal Oriented Zoning Model (GOZ) which they have been presenting to municipalities throughout the watershed management area. The model allows a user to view the “build out” impacts of existing master plans and zoning ordinances and test center-based “smart growth” alternatives to the conventional approach to local planning.

Watershed Management Area 12

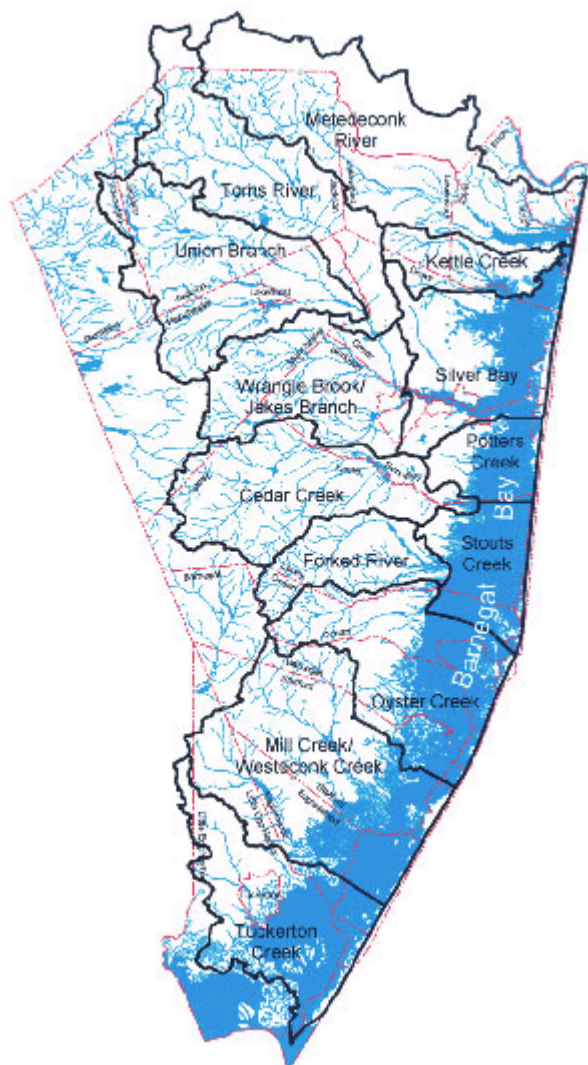
Watershed Management Area 12 is comprised of six coastal subwatersheds, consisting of 56 municipalities in the Raritan Bay and Atlantic Coastal drainage basins. Although the majority of impacted municipalities are in Monmouth County, several lie Middlesex and Ocean Counties.

The Monmouth Coastal Watersheds Partnership, with significant support from the Monmouth County Planning Board, is currently conducting water resource education activities and assisting the Department in the development of water budgets and TMDLs for segments in the Manasquan subwatershed listed on the state's "List of Water Quality Limited Waters". To assist with the TMDL implementation strategy development, the Partnership has developed, with Princeton Hydro, geomorphic assessments for selected sites in the Manasquan watershed, using Rosgen information to classify stream reaches and to demonstrate cause and effect between stormwater management and changes in stream morphology, with a link to water quality effects. The Partnership has sponsored an update of Monmouth County's GIS aerial layer to provide better resolution than previously available and to include portions of Middlesex and Ocean Counties; the GIS layer will be used in the wastewater management planning process, open space acquisition, and water quality improvement strategies. The Partnership has identified and proposed to NJDEP Action Now projects and open space acquisition priorities for watershed improvement and protection.

The Partnership has sponsored the development of (a) a Clean Marina Guidebook for the subwatersheds; (b) a home gardener Integrated Pest Management and Best Management Practices Demonstration Project by the Master Gardeners of Monmouth County; (c) a nonpoint source project at Sylvan Lake to remove goose feces and monitor the lake for bacteria concentrations; (d) a Freehold Soil Conservation District nonpoint source education effort; (e) volunteer monitoring by New Jersey Public Interest Research Group; (f) educational watershed seminars by Monmouth University; (g) open space acquisition and funding source by the Monmouth Conservation Foundation; and (h) an extensive Web page at www.visitmonmouth.com/area12.

Watershed Management Area 13

The Barnegat Bay-Little Egg Harbor Estuary and surrounding watershed encompasses most of the 33 municipalities in Ocean County as well as four municipalities in Monmouth County. Although long recognized for its great aesthetic, economic, and recreational value, this backbay system is now affected by an array of human impacts that potentially threaten its ecological integrity.



Watershed management planning for WMA 13 is being funded primarily under the Barnegat Bay Estuary Program (BBEP). The BBEP is "a partnership of federal, state, and local interests" overseeing the development of a management plan and the community efforts in the Bay area. The Program is made up of subcommittees who oversee the various aspects of the management plan: the Citizens Advisory Committee, the Science and Technical Advisory Committee, the Management Committee, and the Policy Committee. The BBEP Office is within the Ocean County Planning Department.

The Barnegat Bay Estuary Program has completed an extensive characterization report for the Barnegat Bay-Little Egg Harbor estuary and watershed. The final Comprehensive Conservation and Management (CCMP) for the estuary and watershed is completed and has been approved by the Governor as of May 15, 2002. The CCMP is divided into four major action plans: Water Quality/Water Supply; Habitat and Living Resources; Human Activities and Competing Uses; and Public Participation and Education. The plan also identifies and prioritizes action items for each of the four action plans that are needed to protect the Barnegat Bay Estuary. For a summary of water quality issues affecting the Bay see section 3.3c within the *Estuary and Coastal Assessment* contained in this report. The BBEP web address is www.BBEP.org. The characterization report and the CCMP may be viewed from the website and information on current events and activities are also available through this Internet link.

The Department is funding an action now project with the BBEP in the watershed that is associated with an action item in the CCMP. The proposed project is a natural lands restoration of sand dune areas along the eastern shore of Barnegat Bay. The project will protect and restore a threatened natural sand dune area from erosion while providing for additional open space. The project will entail a multi-phased approach to reduce wave actions using bio-log technologies and actual dune grass and other vegetation plantings to restore and enhance dune and wildlife habitat. The Department is also funding a project to retrofit and increase the efficiency of stormwater basins, in subwatersheds with segments listed on the state's "List of Water Quality Limited Waters", over the next two years to reduce nonpoint pollution and assist stormwater recharge or infiltration.

Watershed Management Area 14

The Mullica River and tributaries are considered the primary drainage system for the Pinelands. The total area of the drainage basin (Mullica River and tributaries) is some 561 square miles. Major tributaries within the watershed include the Wading River, Nochescatauxin Brook, Atsion Creek, the Bass River, Batsto River, Nescochaque Creek, Landing Creek, Hammonton Creek and the Oswego River. The Mullica River empties into Great Bay, a large estuarine system.

The Pinelands Commission has established a Mullica River Planning Project Web site at www.state.nj.us/pinelands/mullica. The Pinelands Commission has reevaluated the water quality and ecological impairments on the integrated list, taking into account the unique nature of the Pinelands area and the Commission's extensive data set. The Commission is expected to prepare a *New Assessment Strategy to Rank Stream Impairments in a Coastal Pinelands Environment*, which will provide for a more appropriate allocation of remediation resources to this area. A GIS-based characterization of the watershed and a water quality improvement project list for future funding were also developed.

The Pinelands Commission has been reviewing the stormwater systems of the area's municipalities with the intent of developing regional/municipal stormwater management plans to address non-point pollution. Currently, the Commission is in talks with Hammonton Township to develop a proposal for a municipal stormwater plan to address the problems in Hammonton Lake and Hammonton Creek; both are on the integrated list and in the memorandum of agreement with EPA for expedited TMDLs.

The Commission has also proposed to inspect and evaluate the existing stormwater management basins that have been constructed. Inefficient basin design and operation has increased nonpoint source contaminant concentrations in area streams.

The Department is sponsoring the Pinelands Commission in its development and implementation of a comprehensive program to reduce non-point source pollution that is caused by the use of conventional septic systems. This will supplement the work of a previously formed Ad Hoc Committee on Alternative Septic Systems that is investigating the use of innovative wastewater technologies that reduce the levels of nitrogen, phosphorus, biochemical oxygen demand, total suspended solids and other contaminants in septic system wastewater.

Watershed Management Area 15

The Great Egg Harbor River is 49 miles long and drains an area of 304 square miles. It originates in eastern Gloucester and Camden Counties, an agricultural and suburban area, before flowing through the Pinelands region. The river drains into Great Egg Harbor Bay before emptying into the Atlantic Ocean. The major tributaries are Hospitality Branch, Watering Race, Babcock Creek, Deep Run, South River and Stephens Creek. There are many lakes and ponds in this area, but the largest is Lake Lenape, near Mays Landing.

The Atlantic County Planning Department's watershed management effort has (a) developed a GIS-based characterization of the watershed to assist with issues identification; (b) performed an environmental assessment associated with the construction of a regional stormwater detention facility designed to alleviate local flooding and maintain and improve water quality in and around a county park; (c) increased watershed education in the county through expansion of the Adopt-a-Stream program; (d) incorporated additional environmental criteria into the county's open space acquisition process and list; (e) developed a water quality improvement project list for future funding (f) verified the bioassessment sampling results related to 303d listed sites for the TMDL process; (g) produced GIS parcel mapping for a digital block and lot coverage which will be maintained by the county to expedite property owner identification for open space acquisition and provide more accurate property identification for the wastewater management planning process; (h) developed a Web page at www.aclink.org/planning/area15.

Watershed Management Area 16

Cape May County is located at the southern-most point of New Jersey and represents a continuation of the Atlantic Coastal Plain. The watershed management area includes watersheds draining the Cape May portion of New Jersey. The region includes Cape May County south and east of the Tuckahoe River, Dennis Creek, Delaware Bay Coastal Drainage and Cape May Atlantic Coastal (ocean) Drainage. The county's permanent year-round population is about 77,000, with approximately 42 percent of the population residing on the barrier islands that comprise the eastern perimeter of the peninsula. The summertime population rises to 564,000, with 69 percent residing on the barrier islands. The region contains minimal surface water flow. Ground water and shellfish harvesting water quality are the principal water issues.

The Cape May County Planning Office has developed GIS-based watershed characterizations to facilitate environmental goal-setting and problem analysis. This watershed management process will have significant groundwater quality and quantity analyses provided by means of recently passed state legislation and funding. These analyses will address the significant water supply issues that could threaten the barrier islands and sensitive land features that exist throughout the watershed.

Watershed management in Cape May County has (a) developed the Cox Hall Creek action now project including preliminary field investigation and sampling costs leading to a 319h grant award for restoration activities; (b) produced GIS parcel mapping for a digital block and lot coverage which will be maintained by the county to expedite property owner identification for open space acquisition and provide more accurate property identification for the wastewater management planning process; (c) verified bioassessment sampling results related to 303d listed sites for the TMDL process; (d) conducted GPS of all stormwater outfall pipes in the watershed and incorporate locations into a GIS layer for nonpoint source investigation and remediation project development; (f) developed a GIS-based watershed characterization to facilitate water quality and water supply problem analysis; (g) evaluated water quality data for TMDL implementation strategy development; (h) developed an action now project list; and (i) developed a web page linked from www.capemaycountygov.net.

Watershed Management Area 17

Watershed Management Area 17 is comprised of the watersheds of the Salem River, Alloway and Hope Creeks, the Cohansey River and the Maurice River and associated tributaries. This area includes portions of Atlantic, Cumberland, Gloucester, and Salem counties, over 39 municipalities and encompasses 885 square miles.

A draft computer-based, interactive Characterization Report was rolled-out at the May 15, 2002 meeting. The final watershed characterization developed from the compiled data will be available to the public on the watershed website in the near future. CDs with the information will also be made available. This effort will make massive amounts of data and information readily accessible and usable for assessing scope and causes of impairments. Sites for expanded Existing Water Quality monitoring stations were selected. Watershed partners will be engaged in an exercise to identify potential sources of fecal impairment at a meeting regarding the expedited TMDLs to be held December 10, 2002.

The AmeriCorps Watershed Ambassadors for WMA 17 continue to coordinate citizen volunteer training for Department's Biological Assessment TeamS (BATS) and River Assessment TeamS (RATS). The BATS and RATS programs allow citizens to gain skills and the experience needed to monitor local waterways using identification techniques. The information that is gathered will be used to identify sources of impairment and sites that are candidates for Action Now restoration projects. One project currently funded will help to identify the root causes of impairments Parvin Branch and Tarkilin Brook (tributaries to the Maurice River) via intensive physical, biological and chemical monitoring, extensive education and outreach on NPS

pollution. In addition, a special allocation of \$1.3 Million of Corporate Business Tax (CBT) money was allocated for the purpose of setting up a State Conservation Cost Share program to assist farmers in WMA 17 to implement conservation management plans on their farms. Given that NPS are a major source of the pollutants for which there are impairments in WMA 17, addressing agricultural sources of NPS will help to improve water quality.

Watershed Management Area 18

Watershed Management Area 18 is comprised of the watersheds of the Pompeston Creek, Swede Run, Cooper River, Woodbury, Big Timber and Newton Creeks, Mantua Creek and Raccoon and Oldmans Creeks. WMA 18 covers all or parts of Burlington, Camden and Gloucester counties, including 68 municipalities covering 391 square miles.

The Characterization Report for WMA 18 has been completed, providing a tool for assessment of causes of impairments. An environmental issues list was compiled as well as an Action Now project list for needed restoration projects. Grant awards from federal sources, including 319(h) and the DELEP mini-grant program, have been used for environmental restoration work for projects such as Gloucester City Municipal Lake Water Quality Enhancements, Biofilter Wetlands/Sediment Traps for Stormwater Treatment and Lake Inlet Stabilization in the vicinity of Newton Lake. Completion of comprehensive RATS data collection for sites across all ten sub-watersheds was a major work effort in this WMA. A TMDL was completed for Strawbridge Lake and follow-up projects were initiated to refine the implementation plan.

Watershed Management Area 19

Watershed Management Area 19 represents the Rancocas Creek Drainage Basin. Portions of Burlington, Camden and Ocean counties, and approximately 33 municipalities, are within this management area which covers 360 square miles, and reaches deep into the Pinelands Preservation Area.

A Characterization and Assessment report for the Rancocas Watershed was completed in May of 2002. The report was distributed in CD format throughout the watershed and will be used to identify the scope and cause of impairments. A project was undertaken with Dr. Mark Robson from UMDNJ-School of Public Health to perform a Watershed Pesticide Monitoring Pilot Project. This project will analyze run-off from three different sites within the watershed, a residential development, a golf course and a farm field, and compare the levels/types of pesticides from each land-use. An interim report based on results from the first round of sampling was made to the PAC at the May 2002 meeting. The final results/ report is forthcoming and will inform root cause analysis.

A Riparian Buffer Gap Assessment was completed which evaluates the presence, absence and condition of the riparian buffer in the principal tributaries within the Rancocas Creek Watershed Management Area. Helicopter fly-over and video taping occurred in winter/spring 2002. The Conservancy reported out to the PAC at the July 2002 meeting. 176 linear miles of streams

throughout the watershed were assessed. Acreage of buffers present was calculated and presented in a summary table. Forested and non-forested areas were digitized then overlaid on county 2000 aerials from which maps were created and displayed at the November 2002 PAC meeting. A final report from the Heritage Conservancy will be forthcoming. This tool will be used to identify potential causes of biological impairment as well as areas in need of restoration.

A ranking system for Open Space Prioritization has been devised to prioritize open space considering factors such as water quality benefit, development pressure, and continuity with existing open space. Parcel based mapping for the watershed that shows the priority areas is being developed.

Several 319(h) projects have been implemented, including riparian reforestation, streambank stabilization, BMP installation and others expected to positively influence water quality.

Watershed Management Area 20

Watershed Management Area 20 represents the watersheds of Crosswicks Creek, Doctors Creek, Assicunk Creek, Crafts Creek and Blacks Creek. This watershed management area is comprised of 26 municipalities spanning four counties: Burlington, Mercer, Monmouth and Ocean encompassing 253 square miles. Crosswicks Creek, entering the Delaware River at Bordentown, is 25 miles long and drains an area of 146 square miles. Major tributaries include Jumping Brook, Lahaway Creek, North Run and Doctors Creek. Tides affect this stream up to the Crosswicks Mill Dam. Allentown Lake, Oxford Lake, Prospertown Lake, and Imlaystown Lake are major impoundments in the Crosswicks Creek Watershed. Important land uses in this watershed include agriculture, residential/commercial development and military installations, with remainder covered by woodland areas.

A TMDL was completed for Sylvan Lake. Lake restoration activities are expected to result in elimination of the listed impairments for this lake. Several watershed projects have been implemented in the WMA. Currently two projects are underway using 319(h) funds made available through the Clean Water Act. The first project is the Crosswicks Creek - Oakford Park and Paradise Park Restoration. Oakford Lake is upstream of a moderately impaired AMNET monitoring site, and Oakford Lake is listed on the 303(d) list for total phosphorus. Both parks have a growing Canada Geese problem since they provide ideal habitat for resident Canada Geese. Both Parks have severe erosion problems due to human and waterfowl activities. Therefore the applicant, Plumstead Township, is proposing a vegetated stream bank buffer to stabilize the stream banks, block waterfowl access and to serve as a biofilter for stormwater runoff. The second project is the Shady Brook Pond Restoration Project. Hamilton Township, Mercer County has been doing routine testing of the pond and has identified fecal and dissolved oxygen as significant water quality issues which need to be addressed. The pond is experiencing many problems with resident Canada Geese and past poor management practices. The proposed project will create a wetland buffer to surround the pond to act as a biofilter for NPS pollution and to discourage Canada Geese from accessing the pond.

Nonpoint Source Pollution Control Program: Section 319(h)

The Clean Water Act of 1972 has helped clean up of many of our country's waters, often achieving dramatic improvements. States, territories, and tribes estimate that at least half of these impairments are caused by nonpoint source (NPS) pollution, making it the Nation's leading source of water quality problems. To address these problems, Congress amended the Clean Water Act in 1987 and established the NPS Pollution Management Program under section 319 of the amendments. The program provides states, territories, and tribes with grants to implement NPS pollution controls described in approved NPS pollution management programs.

In 1990, the U.S. Environmental Protection Agency (EPA) began awarding grants to states, territories, and tribes with approved programs. Efforts to control runoff from agricultural land, urban sources, septic systems, and construction received significant funding under section 319, as did projects to manage wetlands and NPS pollution from forestry, habitat degradation, and changes to stream channels.

A well-developed NPS management program supports activities with the greatest potential to produce early, demonstrable water quality results; assists in the building of long-term institutional capacity to address NPS pollution problems; and encourages strong interagency coordination and ample opportunity for public involvement in the decision-making process.

New Jersey's 319 nonpoint source project funds measures that mitigate or prevent impairments to lakes, bathing areas, drinking water intakes, shellfish beds, special aquatic habitats, and stream corridor integrity. These measures can be applied to impaired waters that need to develop and implement total maximum daily loads. Examples of projects include such measures as stream bank and lake restoration, structural and nonstructural stormwater management measures, urban retrofit, and nonpoint source assessment leading to remediation. Table 4.2a-1 includes a description of projects funded in State fiscal years 2000 through 2002. For more information, please see http://www.state.nj.us/dep/watershedmgt/nps_program.htm.

Table 4.2a-1: Water Quality Projects funded with Section 319(h) Funds in State Fiscal Years 2000 through 2002

FY	RECIPIENT	PROJECT DESCRIPTION	WMA
2002	New Jersey Water Supply Authority	Mulhockaway Creek Watershed Study	8
2002	New York/New Jersey Baykeeper	Cedar Brook stream stabilization and buffer enhancement	9
2002	Union County	Warinaco Park Lake and Lagoon Restoration Project	7
2002	Rahway River Association	Robinson's Branch stream stabilization and rehabilitation	7
2002	Somerset County Park Commission	Riparian Buffer Restoration of Pond	10
2002	New Jersey Water Supply Authority	Delaware and Raritan Canal Tributary Assessment and NPS Management	9
2002	Swartswood Lake Watershed Assoc.n	Swartswood Lake Stormwater Management Grant	1
2002	Liberty Township	Mountain Lake and Mountain Lake Brook NPS Control Project	1

Table 4.2a-1 continued

FY	RECIPIENT	PROJECT DESCRIPTION	WMA
2002	North Jersey RC&D	Walkill River Agricultural BMP Project/ NPS Intervention Project	2
2002	Sparta Township	Wallkill River - Glen Brook Restoration	2
2002	Vernon Township	Highland Lakes Regional NPS Project	2
2002	City of Trenton	Assunpink Creek Greenway Restoration Project	11
2002	Roosevelt Borough	Siltation Abatement and Restoration of Wetlands	11
2002	Trout Unlimited	Bear Swamp Brook Restoration	3
2002	Passaic County	Goffle Brook, Goffle Brook Park Restoration of Riparian Corridor, Phase 2 and 3	4
2002	Clifton City Health Department	Race Track Pond at Memorial Park Restoration and Shoreline Stabilization	4
2002	Essex County Dept of Public Works	Verona Park Lake Bioengineering Shoreline Restoration Project	4
2002	Bergen County Dept of Parks	Van Saun Mill Brook Erosion Control	5
2002	Morris County Planning Department	Beaver Brook/Hibernia Brook Stormwater Management Plan	6
2002	Whippany River Watershed Action Committee	Whippany River Watershed Detention basin retrofit in Mendham Township	6
2002	Whippany River Watershed Action Committee	Speedwell Lake at the Whippany River - Phases 1-4	6
2002	Gloucester City Sewer & Water Department	Municipal lake water quality management - Newton Creek Watershed	18
2002	Moorestown Board of Education	Retrofitting stormwater management facilities of the public schools in Moorestown	18
2002	Camden County Department of Parks	Biofilter Wetlands/Sediment Trap for Stormwater Treatment in the Watershed of Newton Lake	18
2002	Willingboro Township	Implementation of water quality BMPs in Willingboro Twp. In the Rancocas Creek Watershed	19
2002	Citizens United to Protect the Maurice River and its Tributaries	Parvin Branch and Tarklin Brook Assessment and Monitoring	17
2002	Cinnaminson Twp Public Schools	Retrofit of a stormwater outfall and stream bank restoration of the Pompeston Creek	18
2002	Plumstead Township	Crosswicks Creek - Oakford Lake and Paradise Park Streambank Restoration for Water Quality Improvement	20
2002	Hamilton Township	Shady Brook Pond wetlands buffer restoration for water quality improvement	20
2002	Friends of Monmouth County Parks System	Riparian Restoration in the Manasquan Watershed	12
2002	Fairleigh Dickinson University	Mapping of SAV in Barnegat Bay	13
2002	Tuckerton Boro	Lake Pohatcong Restoration	13
2002	Lakewood Township	Lake Carasajo Diagnostic/Feasibility Study	13
2002	Cape May County	Cox Hall Creek feasibility study and restoration plan	16

Table 4.2a-1 continued

FY	RECIPIENT	PROJECT DESCRIPTION	WMA
2002	Folsom Boro	Clean out of existing stormwater collection system in Folsom Boro	15
2001	Mount Holly Township	To construct a biofilter wetland complex at the edge of Woolman Lake, Mount Holly to purify turbid stormwater runoff.	19
2001	Township of Riverside	Stormwater Inventory and Management Plan	19
2001	County of Camden	To construct a biofilter wetland on the north side of Cooper River Lake in Collingswood.	18
2001	Pompeston Creek Watershed Association	Retrofit two detention basins and stabilize eroding stream banks along Pompeston Creek.	18
2001	City of Woodbury	Stabilize & restore eroded portion of Woodbury Creek.	18
2001	Delaware Riverkeeper Network (American Littoral Society)	Riparian buffer completion along Cooper River Lake in Collingswood	18
2001	County of Gloucester	Repair sedimentation & erosional problems along Rowan University stream corridor (Chestnut Branch, Mantua Creek)	18
2001	Hamilton Township (Mercer)	Restore Robert L. Martin Lake and Pond Run areas by reducing pollutant load, and install an aquatic shelf to increase riparian zone for geese.	11
2001	Lawrence Township (Mercer)	Restore & stabilize 450 linear feet of bank along Colonial Lake thru wetland plantings.	11
2001	North Jersey Resource Conservation & Development Council	Implement a comprehensive watershed restoration strategy to improve water quality in the Upper Delaware.	1
2001	Township of Bloomfield	Addresses a biologically impaired site (Clark's Pond) on the Third River thru streambank restoration.	4
2001	Hackensack Riverkeeper Inc.	Addresses a biologically impaired site (Cole's Brook in Staib Park) on the VanSaun Brook—which is a tributary to the Hackensack River.	5
2001	Whippany River Watershed Action Committee Inc.	Continuation of a streambank restoration (Phase II Burnham Park, Atno Brook) previously funded to address fecal impairment.	6
2001	Marine Trades Association of New Jersey	Proposes to increase awareness & encourage implementation of innovative pollution control measures by NJ Marinas.	State-wide
2001	Fairleigh Dickinson University	Proposes to plant eelgrass & widgeon grass as a technique for increasing water quality & reducing nonpoint source pollution in Barnegat Bay; to perform additional monitoring.	13
2001	Sylvan Lake Commission	Proposes to construct a concrete containment area to capture sediment & debris from the stormwater trunk line serving portions of Neptune City & Neptune Twp.	12
2001	Philadelphia Academy of Natural Sciences	Rapid bioassessment protocol for algae.	State-wide

Table 4.2a-1 continued

FY	RECIPIENT	PROJECT DESCRIPTION	WMA
2001	Hudson County, Office of Strategic Revitalization	Will demonstrate the applicability & utility of urban stormwater best management practices.	5
2001	Rutgers University	Will modify time of concentration methodology to properly reflect the predeveloped conditions in south and central jersey so that local runoff is properly assessed and managed.	State-wide
2001	NJ Department of Agriculture	Provide support to NJDEP Watershed Mgt Program and Nonpoint Source Implementation Program	State-wide
2001	Rutgers University, Office of Continuing Professional Education	Develop & promote best mgt practices in stormwater mgt and NPS pollution control in NJ through electronic outreach & training.	State-wide
2001	Hopewell Township (Mercer)	Woolsey Brook watershed improvement project; construction of 2 parking areas on the Hopewell Twp Mun facility utilizing porous paving.	11
2001	Ramapo College	Riparian restoration for Ramapo Reservation Lake Mahwah Twp.	3
2001	Skylands CLEAN	Pequannock River; channelized stream re-naturalization, Route 23-West Milford/Jefferson Twps.	3
2001	Hudson-Essex-Passaic SCD	WMA 3 Watershed Restoration Master Plan and Streambank Restoration will address all 3 AMNET mod impaired sites.	3
2001	Dover Township	To develop a multi-phase development & implementation plan designed to coordinate NPS strategies throughout the Long Swamp Creek watershed.	13
2001	Middletown Township Environmental Commission	To perform an assessment of McClees Brook for a wetland restoration project.	16
2001	City of Linwood	To restore Mary Jane Pond and retrofit the stormwater drainage system that feeds into it. There is also an education & outreach component for local schools.	15
2001	ANJAC	To perform a reforestation project in the headwaters of East Creek in Dennis Twp and perform monitoring.	16
2001	City of Rahway	To restore flood plain habitat and improve water quality of the Rahway River watershed at Union & Allen Streets.	7
2001	Upper Raritan Watershed Association	Assess causes of the current quality of the Peapack Brook in Chester Borough, Chester Twp, Boro of Peapack-Gladstone, and Bedminster Twp, and develop management strategies to protect & restore those areas.	8
2000	North Jersey RC & D	A Watershed Approach to Riparian Restoration	1
2000	Rider University	Centennial Lake: The University Model	11

Table 4.2a-1 continued

FY	RECIPIENT	PROJECT DESCRIPTION	WMA
2000	Gloucester County Parks & recreation	Backyard BMPs and Wildlife Habitats Project	17
2000	Salem County Dept of Planning	Salem County GreenKeepers Plan	17
2000	Ken Lockwood Chapter of Trout Unlimited	Restoring Our Rivers	10
2000	NY/NJ Baykeeper	Rahway River Watershed NP Pollution Implementation Project Milton Lake & Robinson's Branch, Rahway River Watershed	7
2000	South Branch Watershed Association	Action Plan Presentation to Communities to Address Nonpoint Source Pollution	8
2000	Borough of Middlesex	Restoration of Victor Crowell Park	9
2000	Ocean County SCD	Barnegat Bay Watershed-Specific Activity Guide	13
2000	Urban Cons Action Partnership (UCAP, Inc.)	Best Management Practices Workshop for WMA 6	6
2000	Stony Brook(restoration)	Streambank restoration on the Millstone River and Stony Brook	10
2000	Smithville (restoration) Burlington County SCD	Smithville Farm Environmental Restoration Project	19
2000	Mt.Holly (restoration)	Riparian Forest Buffer, Streambank Stabilization & Education Program for the Mill Dam/Ironworks Park along the Rancocas Creek	19
2000	Science & Research	NJ Air Deposition network	State-wide
2000	USGS	Toms River NPS Data Analysis	State-wide
2000	NJDA	Non-point source	State-wide
2000	Rutger's	Municipal NPS Program Guide	State-wide
2000	S&R F&W	Integrated Aquatic Assessment	State-wide
2000	USGS	Ecological Assessment Methodology	State-wide
2000	Swartswood Lakes Asso.	Watershed action NPS	State-wide
2000	Ten Towns Great Swamp: Site 28 Loantaka Brook -c/o Morris 2000 (watershed action NPS)	This project will design best management practices to correct sediment deposition and erosion at site 28 in the Loantaka Brook sub-watershed. These designs will be constructed as well as implemented. They will also develop a new way to continually monitor.	6

Table 4.2a-1 continued

FY	RECIPIENT	PROJECT DESCRIPTION	WMA
2000	Whippany River Watershed Action Committee, Inc.	Whippany River Streambank Restoration, town of Morristown, NJ & Twp. Of Morris-project design & construction for Bryant's stream, project design and phase one construction for the East Lake in Morristown's Burnham Park, Atno Brook	6
2000	Rockaway River Watershed Cabinet c/o Morris 2000	Whippany River Streambank Restoration, town of Morristown, NJ & Twp. Of Morris-project design & construction for Bryant's stream, project design and phase one construction for the East Lake in Morristown's Burnham Park, Atno Brook	6
2000	Water Monitoring		State-wide
2000	Science&Research (watershed action NPS)	Raptors	State-wide
2000	NJDA(watershed action NPS)	Fred Kelly	State-wide
2000	Seaside Heights	Watershed Action oriented NPs	State-wide
2000	Rutgers	NPS-education	State-wide
2000	Lafayette 4-H Club	Abbett Avenue Clean Water Project, this project will provide the Lafayette 4-H members (62) hands on workshop and activities to restore and clean the river bank area along Patriot's Path	6
2000	Passaic River Coalition	Watershed Management Area #6 Riparian Forest Buffer Protection Program will create a municipal based program to educate and implement a stream corridor protection program to enhance riparian forest buffers in WMA #6. This program will be modeled after the Chesapeake Bay Project.	6
2000	Passaic River Coalition – Upper Passaic River Riparian Conservation Committee	Protection of Water Resources from NPS Pollution in the Upper Passaic River Watershed from Bernards to Chatham and Summit, The Upper Passaic River Riparian Conservation Committee proposes to protect the water resources from NPS pollution in this watershed by the continuation of a riparian conservation project begun in 1998 through identification of recharge areas and protection of upland areas.	6
2000	Passaic River Coalition – Passaic Valley Ground Water Protection Committee	Protection of Ground Water from NPS Pollution in the Central Passaic River Basin of WMA #6. This project will be a continuation of well head protection work delineated within the WMA to start implementing NPS pollution prevention	6

Table 4.2a-1 continued

FY	RECIPIENT	PROJECT DESCRIPTION	WMA
2000	Rockaway River Watershed Cabinet c/o Ten Towns	Stream Corridor Improvement Program – An analysis of stream corridors along the Rockaway River and was identified in the Visions and Strategies report prepared by the Friends of Rockaway River. Stream bank restoration has already been started and this project will be a continuation.	6
2000	Great Swamp Watershed Association	Stormwater Management via Blue/Green Technologies Video will detail the blue/green approach to stormwater technologies. These technologies apply alternative, nonstructural approaches to stormwater management.	6
2000	Ten Towns Great Swamp Watershed Management Committee c/o Morris 2000	Implementation of Riparian Forest Buffers and Public Awareness Program in the Great Swamp Watershed will install 7 miles of riparian buffers within the environmentally sensitive Great Swamp watershed. Urban runoff and stream bank erosion has been identified as problems	6
2000	Friends of Rockaway River c/o Passaic River Coalition	Creating and Restoring Wetlands in Upper Berkshire Valley this project will create and restore wetlands on disturbed site that was once an active gravel quarry. A \$300,000 commitment from the NJ Wetlands Mitigation Council has been made to the project. The site's strategic location in the upper watershed offers water quality improvements, flood storage, wildlife habitat and passive recreation.	6
2000	Whippany River Watershed Action Committee – Hanover Township	Whippany River Watershed Action Committee Model Ordinances – This subcommittee of the Whippany PAG of municipal officials through an interlocal agreement will support a model ordinance for stormwater management in all 16 municipalities in the Whippany River Watershed.	6
2000	Whippany River Watershed Action Committee – Mt. Lakes Township	Restoration of the Whippany River Watershed through implementation of BMPs by Municipal Department of Public Works – This project will address identified NPS problems in the Whippany River watershed such as bacteria phosphorous and sedimentation. By engaging the DPW personnel and municipal officials in implementing solutions	6
2000	Union County	Echo Lake	7

New Jersey Environmental Infrastructure Financing Program (Land Acquisition)

The New Jersey Environmental Infrastructure Financing Program (EIFP) provides low-cost loans to municipalities, sewerage and utility authorities and other local government units for the purpose of land acquisition and conservation. "Land acquisition and conservation" means the fee simple purchase or easement acquisition by a local government unit of land that is deemed by the Department as appropriate for water quality protection. The Financing Program loans cover the certified market value of the parcel, as well as costs related to the recipient's administration of the project (up to 3% of land costs) and an allowance for planning and design (generally 10 to 15% of land costs).

Financing is provided from two sources, the Wastewater Treatment Fund (the Fund, administered by the New Jersey Department of Environmental Protection) and the New Jersey Environmental Infrastructure Trust (the Trust). The Fund provides loans at 0% interest for approximately 20 years for one-half of the allowable project costs. The Trust offers loans at about the market rate or less for the remaining allowable project costs, also for a 20 year term. Between these two funding sources, the rate on loans is less than half of the market rate obtainable by a local government unit. In 2001, the Program's interest rate was 2.2% and in 2002 the rate was 2.15 %.

Each project is evaluated and point scores assigned in accordance with the ranking criteria of the Federal Priority System which is developed each year by the Department. Land acquisition projects are included in the Nonpoint Source Pollution Management category. Projects are certified for funding based on list rank, the amount of available funds, and compliance with the Program's requirements and deadlines. Sufficient funds are anticipated to be available to cover projects in 2003 regardless of project rank.

Projects need to demonstrate a water quality benefit. Therefore, when dividing up a parcel for funding purposes, the project sponsor needs to look at planned or potential uses of the parcel in order to develop combinations that maximize and assure water quality protection. Detailed information regarding the program can be obtained by contacting Victoria Jenkins by e-mail (victoriajenkins@dep.state.nj.us) or at (609) 292-8961.

The following (Table 4.2a-2) is a listing of land acquisitions made under the EIFP in Federal FY 2002.

Table 4.2a-2: Land Acquisitions under the NJ Environmental Infrastructure Financing Program for Federal Fiscal Year 2002.

Municipality	Acres	Description
Allamuchy Township	328.86	The parcels drain to the Pequest River. The proposed acquisition and preservation of the land will result in the protection and maintenance of water quality of the surface water, groundwater and wetland resources of the area on a long-term basis. In addition to protection of these water resources and the prevention of flooding and streambank erosion, valuable plant and wildlife habitat will be protected.
Brick Township	87	The project will be part of the Midstreams Greenway and protects the groundwater recharge in the South Branch of Beaver Dam Creek, a tributary to the Metedeconk River.
Bridgewater Township	30.4	The site is forested and has steep topography that slopes down towards Echo Lake. Chambers Brook flows through Echo Lake and is tributary to the Raritan River.
Edgewater Borough	3.37	The land is characterized by steep slopes and wooded areas located along the Palisades.
Evesham Township	691	The site is located in the Pinelands Protection Area and is adjacent to an existing Township recreation area that is comprised of woods, wetlands and abandoned cranberry bogs.
Holmdel Township	417	The parcel is the largest undeveloped property in Holmdel and includes a 1.5 mile stretch of the Ramanessin Brook, four of its tributaries and two ponds. The parcel consists mainly of cleared land, with several large areas of mature forest. Extensive wetlands, floodplains, steep slopes and wooded areas are located along the Brook
East Windsor	68	Acquires land for Bear Brook Greenway which consists of upland forests, forested wetlands, agricultural fields and meadows.
Hamilton Township	16	Hamilton/Trenton Marsh is a freshwater tidal wetlands that supports several species of flora and fauna and is located along the Delaware River. The parcel is a sparsely wooded lowland to upland forest.
Montville Township	4.26	Open space preservation for the Passaic River watershed.
Readington Township	47.743	The parcel is bounded on two sides by tributaries that join together on the parcel to form the main stem of the Holland Brook. The property is presently open agricultural fields with forested areas along the stream corridors
Roxbury Township	24	The parcel is located on the slope of Mooney Mountain. The lot is forested and gently sloped and contains about one acre of wetlands at the bottom of the slope adjacent to a tributary to Flanders Brook which flows to the South Branch of the Raritan River.

Washington Township	109	The parcel is located within the Assunpink Watershed Area and consists of mixed vegetation and sparsely wooded areas.
West Windsor	202	The land is located in the Duck Pond Run and Little Bear Brook watersheds and consist of mixed-forest area, shrubby areas, farm field and lowland forest vegetation.

The Green Acres Program

The Green Acres Program was created in 1961 to meet New Jersey's growing recreational and conservation needs. As the principal land acquisition agent for the Department of Environmental Protection, Green Acres acquires land, which becomes part of the system of state parks, forests, natural areas and wildlife management areas. To date, Green Acres has protected more than 508,663 acres of open space and developed hundreds of public parks, bringing the state-wide system of preserved open space to more than 1,199,763 acres.

The Green Acres Program administers funds provided by the Garden State Preservation Trust. Green Acres works with landowners, municipal and county governments, nonprofit agencies and other conservation partners to protect land through direct purchase or conservation easement. The program provides low interest (2%) loans and partial grants to municipal and county governments to acquire open space and develop outdoor recreation facilities. The Green Acres Program also purchases land for the Pinelands National Reserve and administers the "Limited Practical Use" initiative to purchase land in the Pinelands from owners of less than 50 acres, whose land use is restricted due to current land use restrictions.

The Green Acres Program also administers the "Tax Exemption Program," which provides exemption from local property taxes to eligible nonprofit organizations that own recreation or conservation lands and allow for public access. More than 38,000 acres of privately owned lands have been opened to the public for a variety of conservation and recreational uses.

The Program monitors municipal and county sites acquired and developed with Green Acres funds and sites acquired by nonprofit organizations with Green Acres matching grants. Stewardship officers inspect these sites to ensure that they are well-maintained, open, and accessible for recreation and conservation purposes.

The Program also provides environmental planning and technical assistance for municipal, county, nonprofit and state open space acquisition and recreational development; and administers the "Payment in Lieu of Taxes Program" to municipalities in which lands are purchased by the DEP or nonprofit organizations for recreational or conservation purposes so that municipalities do not suffer a loss of taxes due to acquisition of lands.

To learn more about protecting your land or partnering with Green Acres to protect land in your region, visit their website at www.state.nj.us/dep/greenacres or call their office at 609-984-0500.

Table 4.2a-3: Purchases in State Fiscal Year 2000, 2001 and 2002 by the Green Acres Program by Watershed Management Area.

Watershed Management Area	<u>Acres</u>
No Watershed - Statewide	17,778
Upper Delaware River	6,207
Walkill, Pochuck, Papakating	1,008
Pompton, Pequannock, Wanaque, Ramapo	10,205
Upper Passaic, Whippany, Rockaway	325
North & South Branch Raritan	270
Lower Raritan, South River, Lawrence Brook	5
Millstone River	31
Central Delaware Tributaries	580
Monmouth Watersheds	171
Barnegat Bay Watersheds	1,582
Mullica, Wading River	2,070
Great Egg Harbor, Tuckahoe	6,865
Cape May Watersheds	2,930
Maurice, Salem, Cohansey	7,175
Lower Delaware Tributaries	225
Rancocas Creek	1,133
Crosswicks Creek	90

Table 4.2a-4: Purchases in State Fiscal Year 2000, 2001 and 2002 by the Green Acres Program by County and Municipality

<u>County</u>	<u>Municipality</u>	<u>Acreage</u>
ATLANTIC	BUENA VISTA TWP	689.65
ATLANTIC	EGG HARBOR TWP	1105.67
ATLANTIC	ESTELL MANOR	0.47
ATLANTIC	ESTELL MANOR CITY	700.95
ATLANTIC	FOLSOM BORO	250.62
ATLANTIC	GALLOWAY TWP	201.95
ATLANTIC	HAMILTON TWP	3455.99
ATLANTIC	HAMMONTON TOWN	664.36
ATLANTIC	MULLICA TWP	2451.537
ATLANTIC	NORTHFIELD CITY	4
ATLANTIC	PLEASANTVILLE CITY	71.89
ATLANTIC	WEYMOUTH TWP	828.405
BERGEN	NEW MILFORD BORO	0.25
BERGEN	RIVER EDGE BORO	0.76
BURLINGTON	BASS RIVER TWP	181.21
BURLINGTON	BORDENTOWN TWP	11.2
BURLINGTON	EVESHAM TWP	342.35
BURLINGTON	HAINESPORT TWP	0.76
BURLINGTON	MEDFORD TWP	815.18
BURLINGTON	PEMBERTON TWP	3.24
BURLINGTON	SHAMONG TWP	20.14
BURLINGTON	SOUTHAMPTON TWP	374.17
BURLINGTON	TABERNACLE TWP	206.98
BURLINGTON	WASHINGTON TWP	454.34
BURLINGTON	WOODLAND TWP	190.18
CAMDEN	WATERFORD TWP	143.73
CAMDEN	WINSLOW TWP	101
CAPE MAY	CAPE MAY CITY	2.362
CAPE MAY	DENNIS TWP	1533.163
CAPE MAY	LOWER TWP	147.771
CAPE MAY	MIDDLE TWP	242.235
CAPE MAY	SEA ISLE CITY	0.17
CAPE MAY	UPPER TWP	464.29
CUMBERLAND	COMMERCIAL TWP	367.966
CUMBERLAND	DEERFIELD TWP	7.38
CUMBERLAND	DOWNE TWP	255.35
CUMBERLAND	FAIRFIELD TWP	481.584
CUMBERLAND	GREENWICH TWP	22.804
CUMBERLAND	HOPEWELL TWP	268.662
CUMBERLAND	LAWRENCE TWP	679.59
CUMBERLAND	MAURICE RIVER TWP	1724.49

Table 4.2a-4, continued

<u>County</u>	<u>Municipality</u>	<u>Acreage</u>
CUMBERLAND	MILLVILLE CITY	807.8
CUMBERLAND	STOW CREEK TWP	512.178
CUMBERLAND	VINELAND CITY	2361.344
ESSEX	CEDAR GROVE TWP	240
ESSEX	FAIRFIELD TWP	9.7908
ESSEX	NORTH CALDWELL TWP	0
ESSEX	VERONA TWP	0
GLOUCESTER	DEPTFORD TWP	4.09
GLOUCESTER	FRANKLIN TWP	621.93
GLOUCESTER	MONROE TWP	734.98
GLOUCESTER	WOOLWICH TWP	100.11
HUNTERDON	ALEXANDRIA TWP	29.581
HUNTERDON	BETHLEHEM TWP	150.151
HUNTERDON	EAST AMWELL TWP	70.7615
HUNTERDON	FRANKLIN TWP	1.77
HUNTERDON	FRENCHTOWN BORO	12.03
HUNTERDON	GLEN GARDNER BORO	37.47
HUNTERDON	HIGH BRIDGE BORO	48.5
HUNTERDON	HOLLAND TWP	245.58
HUNTERDON	KINGWOOD TWP	274.547
HUNTERDON	LEBANON TWP	123.22
HUNTERDON	RARITAN TWP	347.33
HUNTERDON	READINGTON TWP	10.15
HUNTERDON	UNION TWP	94.18
HUNTERDON	WEST AMWELL TWP	522.81
MERCER	EWING TWP	9.8
MERCER	HOPEWELL TWP	453.522
MERCER	WASHINGTON TWP	33.94
MERCER	WEST WINDSOR TWP	48.77
MIDDLESEX	CRANBURY TWP	31.24
MIDDLESEX	MONROE TWP	334.994
MIDDLESEX	OLD BRIDGE TWP	8.5
MIDDLESEX	SOUTH BRUNSWICK TWP	4.164
MONMOUTH	FREEHOLD TWP	1393.863
MONMOUTH	HOLMDEL TWP	40.37
MONMOUTH	MANALAPAN TWP	169.09
MONMOUTH	MIDDLETOWN TWP	0.11
MONMOUTH	ROOSEVELT BORO	110.01
MORRIS	DENVILLE TWP	169.4
MORRIS	EAST HANOVER TWP	5.07
MORRIS	JEFFERSON TWP	2462.536
MORRIS	LINCOLN PARK BORO	4.197
MORRIS	MT OLIVE TWP	75.29
MORRIS	ROCKAWAY TWP	2759.84
MORRIS	ROXBURY TWP	32.02
MORRIS	WASHINGTON TWP	221.511

Table 4.2a-4: continued

<u>County</u>	<u>Municipality</u>	<u>Acreage</u>
OCEAN	BARNEGAT LIGHT BORO	0.826
OCEAN	BERKELEY TWP	2730.187
OCEAN	EAGLESWOOD TWP	7.8
OCEAN	JACKSON TWP	810.212
OCEAN	LACEY TWP	416.443
OCEAN	LITTLE EGG HARBOR TWP	174.099
OCEAN	MANCHESTER TWP	521.63
OCEAN	OCEAN TWP	396.35
OCEAN	PLUMSTED TWP	240.34
OCEAN	STAFFORD TWP	507.51
PASSAIC	LITTLE FALLS TWP	0.582
PASSAIC	NORTH HALEDON BORO	40.42
PASSAIC	POMPTON LAKES BORO	5.426
PASSAIC	WAYNE TWP	4.657
PASSAIC	WEST MILFORD TWP	1673.563
SALEM	ALLOWAY TWP	471.347
SALEM	CARNEYS POINT TWP	36.69
SALEM	EL SINBORO TWP	46.23
SALEM	LOWER ALLOWAYS CREEK TWP	1068.853
SALEM	MANNINGTON TWP	129.62
SALEM	PENNSVILLE TWP	61
SALEM	PIESGROVE TWP	161.27
SALEM	PITTSBURGH TWP	127.72
SALEM	QUINTON TWP	208.7
SOMERSET	FRANKLIN TWP	81.055
SOMERSET	HILLSBOROUGH TWP	188.27
SUSSEX	ANDOVER TWP	80.127
SUSSEX	BYRAM TWP	46.04
SUSSEX	FRANKFORD TWP	162.83
SUSSEX	FRANKLIN BORO	10.502
SUSSEX	FREDON TWP	101.67
SUSSEX	HAMBURG BORO	39.832
SUSSEX	HAMPTON TWP	229.26
SUSSEX	HARDYSTON TWP	531.651
SUSSEX	LAFAYETTE TWP	7
SUSSEX	MONTAGUE TWP	577.22
SUSSEX	OGDENSBURG BORO	131.41
SUSSEX	SANDYSTON TWP	31.994
SUSSEX	SPARTA TWP	910.517
SUSSEX	STILLWATER TWP	871.047
SUSSEX	VERNON TWP	5032.0592
SUSSEX	WANTAGE TWP	308.716
WARREN	ALLAMUCHY TWP	936.96
WARREN	BELVIDERE TOWN	28.61
WARREN	BLAIRSTOWN TWP	309.58

Table 4.2a-4: continued

<u>County</u>	<u>Municipality</u>	<u>Acreage</u>
WARREN	FRANKLIN TWP	0.87
WARREN	FRELINGHUYSEN TWP	197.51
WARREN	HACKETTSTOWN TWP	30.94
WARREN	HARDWICK TWP	706.782
WARREN	HARMONY TWP	270.98
WARREN	HOPE TWP	350.66
WARREN	INDEPENDENCE TWP	5.33
WARREN	KNOWLTON TWP	207.89
WARREN	LIBERTY TWP	539.3199
WARREN	LOPATCONG TWP	22.15
WARREN	MANSFIELD TWP	269.11
WARREN	PHILLIPSBURG TOWN	7.54
WARREN	POHATCONG TWP	129.539
WARREN	WASHINGTON TWP	96.82
WARREN	WHITE TWP	159.043

4.2b New York/New Jersey Harbor; Metals

Background

Based upon historical data assessments for metals, NJDEP originally had concerns that metal levels in the NY-NJ Harbor water column were exceeding surface water quality standards (SWQS) due to point source discharges. An initial assessment of historical data indicated exceedences of SWQS for silver (Ag), mercury (Hg), arsenic(As), cadmium(Cd), lead (Pb), zinc(Zn), nickel (Ni), and copper (Cu) concentrations throughout the Harbor. In 1991 and 1992, additional ambient and point source data were collected using the latest trace metal sampling techniques. The results of the sampling indicated significantly lower metal concentrations compared to the historical data. Exceedences of metal criteria were found only for mercury. The conflicting results were mostly attributed to sample contamination and lower laboratory procedure precision used in collecting and analyzing the historical data.

Additional water quality assessments in the Harbor included the development of a water quality model that predicted possible exceedences of chronic water quality criteria for three metals: copper, nickel, and lead (Hydroqual, 1994). However, it was noted that the data collected for the water quality model focused on New York's waters, but was used to predict water quality exceedences in New Jersey's waterbodies. While the model projected exceedences in these waterbodies, the available ambient data indicated that existing loads were adequate to meet applicable water quality standards. As a result of the various assessments, NJDEP concluded additional sampling of metal data were required to provide conclusive evidence of the current conditions of the water column in the Harbor.

Phase I TMDL

As part of the Phase I TMDL for the NY-NJ Harbor, municipal and industrial loads to the Hackensack River, Passaic River, Raritan River, Newark Bay, and Raritan Bay were limited to their existing loads (also known as EEQs)(59FR41293). In addition to establishing these EEQs, additional data collection and modeling for copper, nickel, and lead were required for these waters. The New Jersey Harbor Discharge Group (NJHDG) agreed to conduct the necessary monitoring and modeling.

The monitoring and analysis was conducted by the Great Lakes Environmental Center (GLEC), on behalf of the NJHDG, to determine whether Cu, Ni, Pb, and Hg were present at levels exceeding the SWQSs. Data collection was conducted on the Hackensack River, Passaic River, Raritan River, Newark Bay, and Raritan Bay for the four metals of concern.

Although numerous water quality criteria exceedences were projected for New Jersey tributaries, Raritan Bay, and Newark Bay based upon the 1991 data; the more comprehensive data set collected in 1995 resulted in few potential water quality exceedences with the exception of mercury. Copper and lead concentrations at all sites were below the SWQS, and nickel concentrations were below the criterion in Raritan Bay, Newark Bay, Raritan River, and Passaic River. However, statistical analysis of nickel concentrations in the Hackensack River showed exceedance of the criterion. In addition, mercury was exceeded in all waters with the exception of Raritan Bay (Great Lakes Environmental Center, 1996).

Phase II

Arthur Kill and Kill Van Kull

The 1991 statistical data evaluations for copper in the Arthur Kill and Kill Van Kull did not show potential exceedences, however, model projections did predict exceedences. No actual measurements exceeded the criterion. As a result of the findings made under Phase I, NJHDG, NJDEP, and EPA developed a Phase II Metals TMDL Monitoring and Modeling Program that focused on copper, nickel and lead in the Arthur Kill and Kill Van Kull; in addition to, sampling of nickel in the Hackensack and Passaic Rivers. Additional copper data were collected in 1997 during wet and dry conditions over a ten month period at four stations, two in the Arthur Kill and two in the Kill Van Kull. Data were also collected for combined sewer overflows (CSO), stormwater outfalls (SWO), and point source discharges. The model was re-run using the more recent ambient data and New Jersey specific discharge data. A statistical projection of the ambient data and the model results both support the conclusion that the copper criterion was not likely to be exceeded in either the Arthur Kill or the Kill Van Kull (GLEC, 1998).

The 1991 model projected SWQS exceedences in the Arthur Kill and Kill Van Kull for nickel and lead based on the *total recoverable* form of the metal. Since that time, the water quality standards for nickel and lead in New Jersey had changed to the *dissolved* form of the metal. As a result of the change in the water quality standards, the potential for SWQSs exceedences had to be re-evaluated based on the *dissolved* form. The probability distributions for ambient dissolved lead and nickel were re-analyzed and there were no projected exceedences. The water quality model was then revised to reflect the new dissolved criteria and also did not project any exceedences of criteria for lead or nickel in the Arthur Kill or Kill Van Kull (GLEC, 1998)(Locicero, 1997).

Results

Nickel

The nickel criterion was not exceeded in the Raritan River/Bay and Newark Bay (GLEC, 1996). No exceedences of criteria for nickel were projected in the Arthur Kill or Kill Van Kull (GLEC, 1998)(Locicero, 1997). EPA also determined that the Passaic River did not exceed the criterion for nickel and no TMDL was needed.(USEPA, 1999). EPA is establishing the TMDL for nickel in the Hackensack River at the request of NJDEP.

Lead

The lead criterion was not exceeded in the Hackensack River, Passaic River, Newark Bay, and Raritan River/Bay (GLEC, 1996). No exceedence of criteria for lead were projected in the Arthur Kill or Kill Van Kull (GLEC, 1998)(Locicero, 1997).

Copper

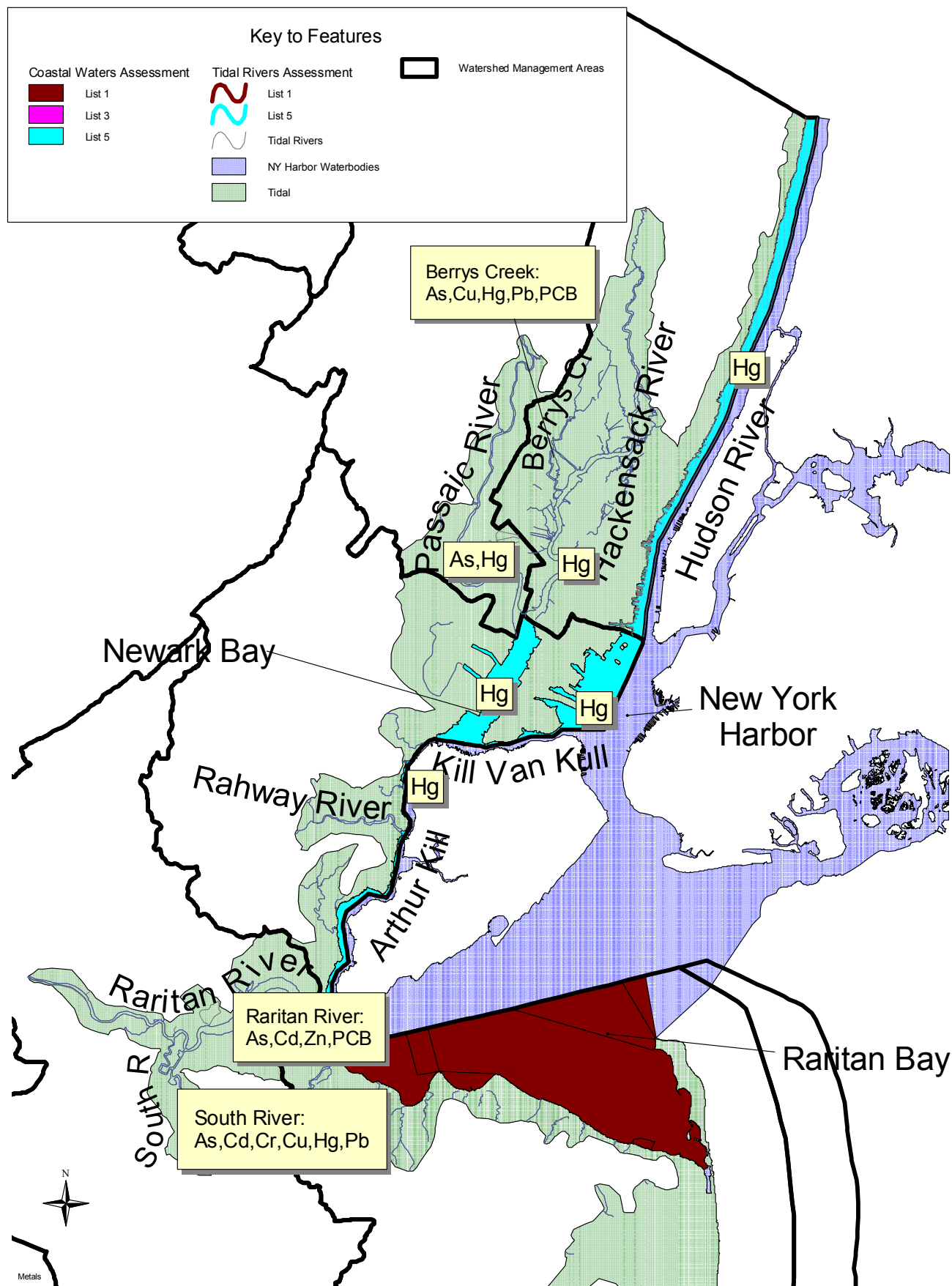
Based on the report submitted by the NJHDG (GLEC, 1996), USEPA agreed that Newark Bay, Hackensack River below the Oradell Dam, Passaic River below the Dundee Dam, Raritan River below Fieldsville Dam, and Raritan Bay were not exceeding the criteria for copper, therefore, no TMDL is required (USEPA 1999). EPA withdrew the copper TMDLs for these waters (FR 49226, September 19, 1997), and also acknowledged that data analysis and modeling projections

(GLEC, 1998) supported delisting the Kill Van Kull and the Arthur Kill from the 303(d) List (USEPA, 1999).

Mercury Mercury is exceeded everywhere except in Raritan Bay (GLEC, 1996).

Table 4.2b-1 2002 Metal Assessment Results for the NY-NJ Harbor Estuary									
WATERBODY	METAL RESULTS				METAL RESULTS				2002 303(d) List
	1991 MODEL RUN				1995 NJHDG Data				
	Ni	Cu ‘	Pb	Hg	Ni	Cu	Pb	Hg	
Passaic R	X	X	X	X				X	List Hg
Hackensack R	X	X	X	X	X			X	Not Listed for Ni, TMDL completed by EPA. List Hg
Raritan R	X	X	X	X				X	List Hg
Raritan Bay	X	X	X	X					Attaining
Newark Bay	X	X	X	X				X	List Hg
Kill Van Kull	X	X	X	X				X	List Hg
Arthur Kill	X	X	X	X				X	List Hg
Note: In a Memorandum of Agreement (May 13, 1999), NJDEP and EPA established a schedule for development of TMDLs in New Jersey. Under this agreement, EPA had committed to completing TMDLs for metals in New Jersey.									

FIGURE 4.2b-1. Metals Status in the NY-NJ Harbor. The toxins PCB, Dioxin, PAH, and Pesticides are on sublist 5 for the entire Harbor



Fecal Coliform and Dissolved Oxygen

Sampling of the interstate waters is conducted by the Interstate Environmental Commission (IEC) at the request of USEPA, Region II under the auspices of the New York- New Jersey Harbor Estuary Program (HEP). The network consists of 42 stations throughout the harbor complex. Some of these stations historically were monitored on the New York edge of the waterbody but were relocated to the mid channel to represent the interstate characteristics of the waterbody.

Overall, the harbor water quality from 1991-2001 is significantly better than pre-1990 conditions. This is the result of:

- construction and upgrading of water pollution control plants;
- increased maintenance of the sewage system (including over 6,000 miles of sewer main);
- increased management of combined sewer overflows;
- the ongoing abatement of illegal discharges; and,
- an enhanced Industrial Pretreatment Program that controls commercial discharges by requiring targeted industries to treat and remove toxics from their wastewater.

The sampling survey consists of two runs per week for five weeks. The survey included wet and dry weather data. See Figure 4.2b-2 for station locations.

Fecal Coliform

The data met the requirements outlined in the Methods Document i.e. 2 or more years of data, minimum 10 samples, and 5 samples within 30 days for geometric mean calculations. Samples were collected during the time of the year when recreation is more prevalent and is considered representative of the water body with regards to the recreation designated use. The harbor area is primarily designated for secondary contact recreation (activities where the probability of ingestion is minimal, including boating and fishing). Data collected over the past five years were used to assess the fecal coliform levels in the harbor area (see Figure 4.2b-2 for station locations)..

The most recent 5 years of IEC data (approximately 50 data points for each station) only violate the SWQS less than 10% of the time (see Figure 4.2b-3 and Table 4.2b-2 for assessment results). This was not surprising as there has been much improvement in the sewerage infrastructure since these waterbodies were listed in the 1980's. In consideration of the recent data, the Department has delisted the harbor waters for fecal coliform. Normally waterbodies delisted by recent data assessments showing compliance with SWQS would be placed on sublist 1. The Department, however, placed the waterbodies in the NY-NJ Harbor on Sublist 3 for recreational use. Although the stations located in the mid-channel areas of the waterbody present a good overview of the waterbody, the Department recognized that a majority of secondary recreation activities occurred closer to the shoreline rather than mid-channel, and questioned whether the mid channel stations would accurately reflect water quality near the shoreline which may be influenced by flows from CSOs. By placing these waterbodies on sublist 3, the Department is acknowledging the possibility of near shore impairments. Additional monitoring and modeling being conducted under the auspices of the NY-NJ Harbor Estuary Program will identify potential designated use impairments. In the meantime, the Department is working with IEC to reevaluate the location sampling stations to better assess all impacts.

Dissolved Oxygen

Dissolved oxygen samples were collected at the surface and near the bottom of the water column monthly during the winter and weekly during the summer months. The assessment was based on approximately 90 samples collected from 1997 to 2001. All stations were assessed as fully attaining (see Figure 4.2b-4). The assessment results are summarized in Table 4.2b-3.

FIGURE 4.2b-2. Station Locations for Dissolved Oxygen and Fecal Coliform Monitoring in the NY-NJ Harbor.

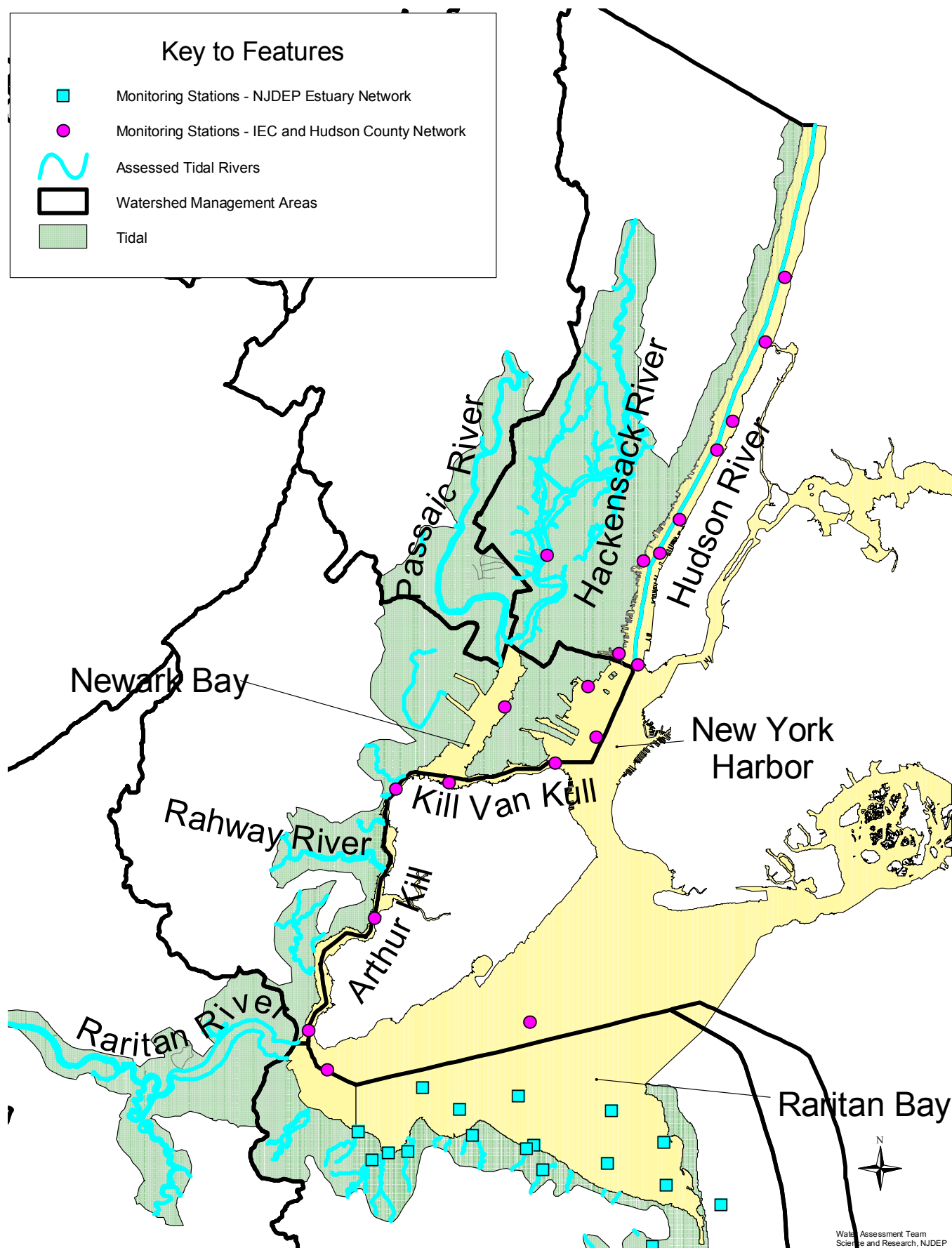


FIGURE 4.2b-3. Fecal Coliform Assessment Results.

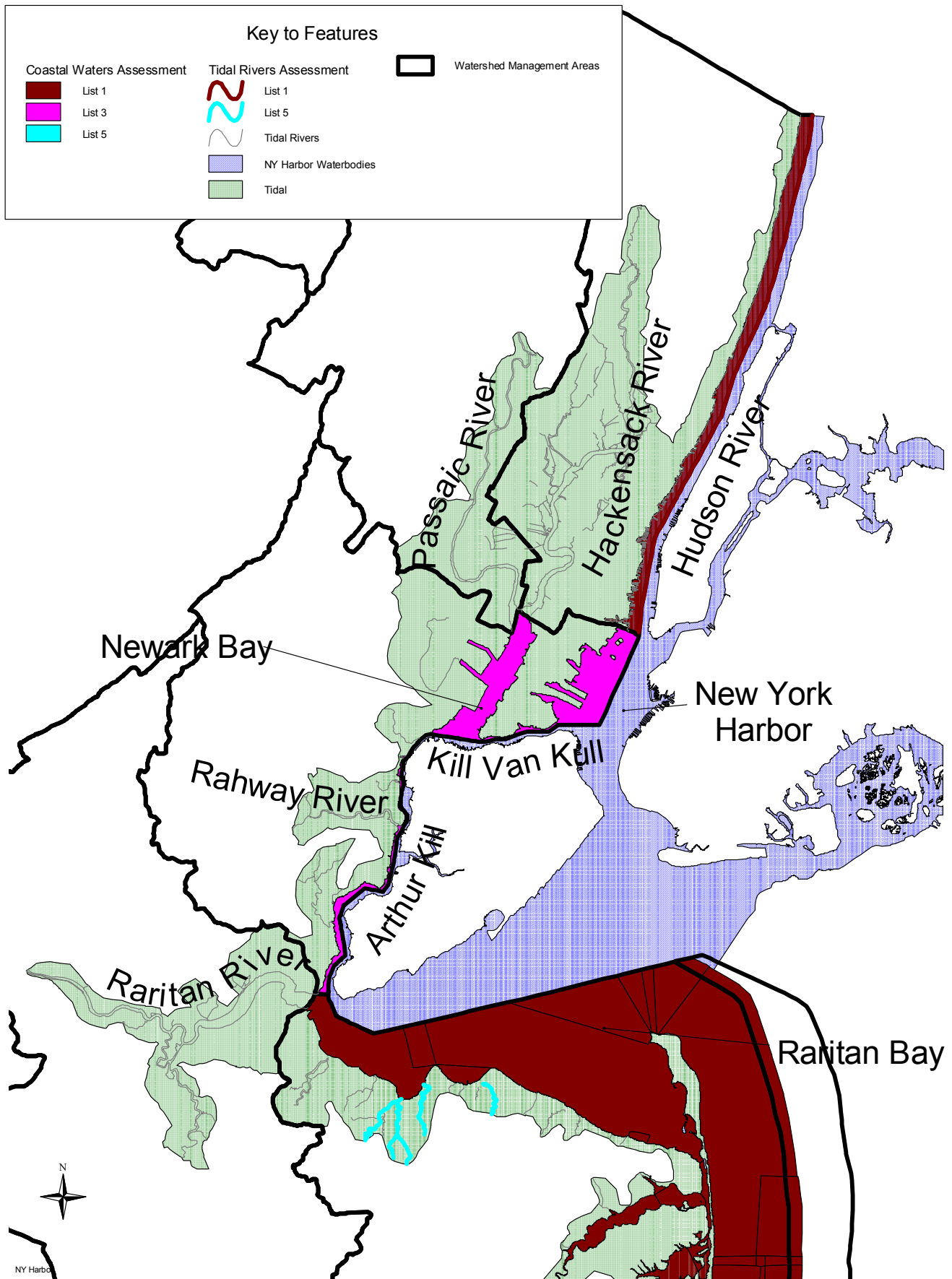


FIGURE 4.2b-4. Dissolved Oxygen Assessment Results.

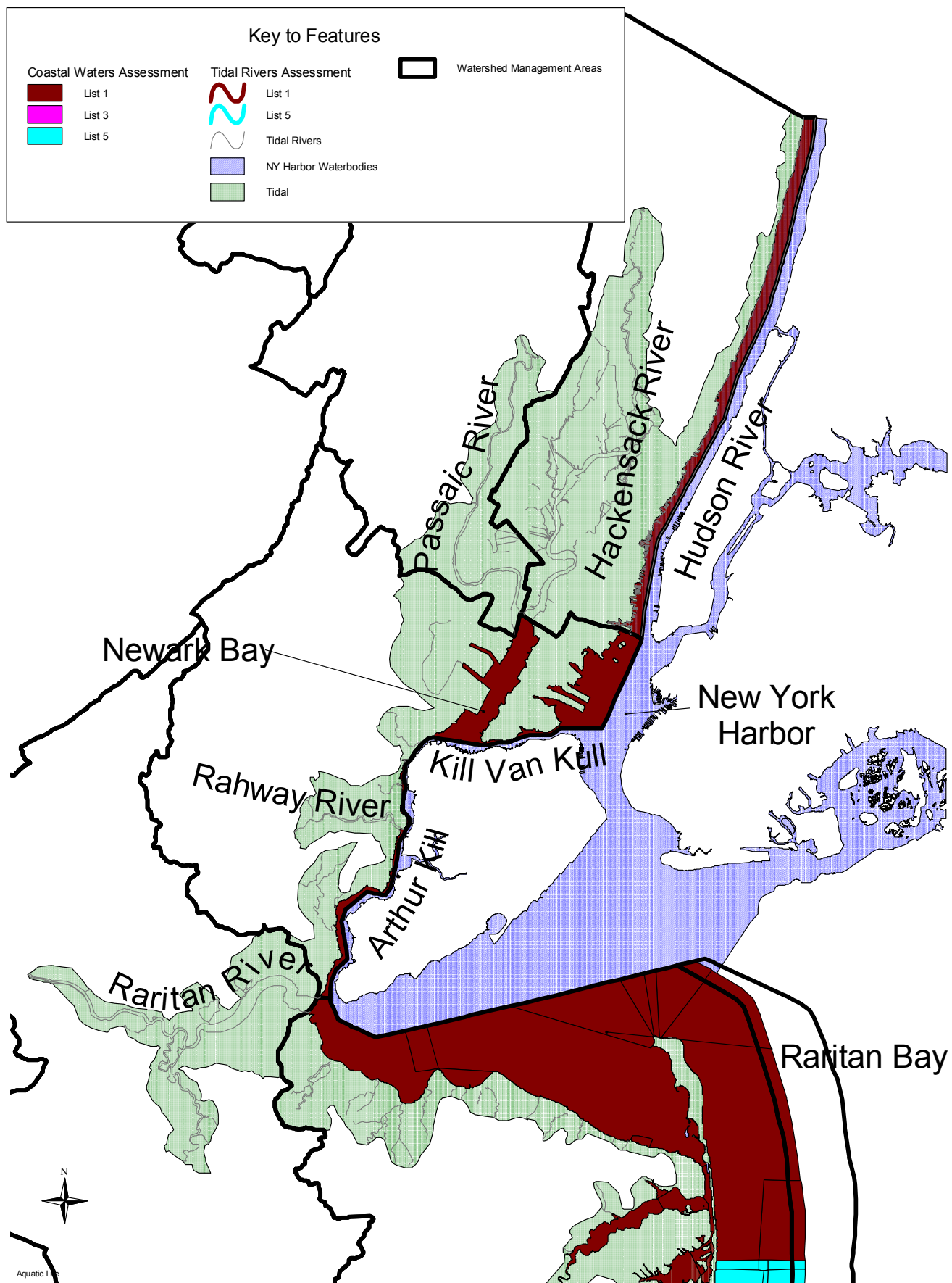


Table 4.2b-2. Assessment Results for Fecal Coliform in the NY-NJ Harbor Estuary

Station	Waterbody	SW Class	Years	FC SWQS (geomean/100ml)	FC (Top) Geomean (per 100ml)	Sample Number	FC (bottom) Geomean (per 100ml)	Sample Number	FC Assessment
K1	Kill Van Kull	SE2/SE3	1997-2001	770/1500	48	68	25	42	Attain
K2	Kill Van Kull	SE3	1997-2001	1500	45	62	9	41	Attain
K3	Arthur Kill	SE3	1997-2001	1500	11	63	110	39	Attain
K4	Arthur Kill	SE3	1997-2001	1500	55	67	53	41	Attain
K5	Arthur Kill	SE2	1997-2001	770	19	68	8	42	Attain
K5A	Raritan Bay	SE1	1997-2001	200(400)	10 (2%)	63	6 (0%)	40	Attain
K6	Raritan Bay	SE1	1997-2001	200(400)	2 (0%)	63	3 (0%)	40	Attain
N1	Hudson River	SE1	1997-2001	200(400)	29 (8%)	66	25 (3%)	36	Attain
N2	Hudson River	SE1/SE2	1997-2001	200(400)/770	34 (8%)	40	33(0%)	36	Attain
N3	Hudson River	SE2	1997-2001	770	47	40	46	35	Attain
N3A	Hudson River	SE2	1997-2001	770	48	41	42	35	Attain
N3B	Hudson River	SE2	1997-2001	770	46	67	37	36	Attain
N4	Hudson River	SE2	1997-2001	770	71	66	42	36	Attain
N5	Hudson River	SE2	1997-2001	770	45	66	17	37	Attain
N6	Hudson River	SE2	1997-2001	770	44	66	0	37	Attain
Location A –	Hackensack River, Secaucus	SE2	summer 2001	770	105	18			Attain
Location B –	Hudson River, Weehawken	SE2	summer 2001	770	115	18			Attain
Location C –	Upper NY Bay, Jersey City	SE2	summer 2001	770	16	18			Attain
Location D –	Newark Bay Hudson County Park;	SE3	summer 2001	1500	52	18			Attain
Location E –	Upper NY Bay, Jersey City	SE2	summer 2001	770	47	13			Attain

Table 4.2b-3. Assessment Results for Dissolved Oxygen in the NY-NJ Harbor Estuary

Station	Waterbody	SW Class	SWQS (not less than)	SWQS (24 hr avg.)	Years	DO: % violations Surface	DO: % violations Bottom
K1	Kill Van Kull	SE2/SE3	4/3 mg/l	NA	1997-2001	0	
K2	Kill Van Kull	SE3	4mg/l	NA	1997-2001	0	
K3	Arthur Kill	SE3	4 mg/l	NA	1997-2001	0	
K4	Arthur Kill	SE3	4mg/l	NA	1997-2001	0	
K5	Arthur Kill	SE2	3mg/l	NA	1997-2001	2	
K5A	Raritan Bay	SE1	4mg/l	5mg/l	1997-2001	2	
K6	Raritan Bay	SE1	4mg/l	5mg/l	1997-2001	0	
N1	Hudson River	SE1	4mg/l	5mg/l	1997-2001	0	
N2	Hudson River	SE1/SE2	4mg/l	5mg/l	1997-2001	0	
N3	Hudson River	SE2	3mg/l	NA	1997-2001	0	
N3A	Hudson River	SE2	3mg/l	NA	1997-2001	0	
N3B	Hudson River	SE2	3mg/l	NA	1997-2001	1	
N4	Hudson River	SE2	3mg/l	NA	1997-2001	0	
N5	Hudson River	SE2	3mg/l	NA	1997-2001	0	
N6	Hudson River	SE2	3mg/l	NA	1997-2001	0	

Section 4.3: Surface Water Quality Monitoring Schedule

Introduction

This section delineates the Department's current surface water monitoring activities and indicates how they relate to the various listings contained within the 2002 Integrated List. Also in this section is a monitoring and assessment plan and schedule for waterbodies currently listed on sublist 3 of the Integrated List.

The Department's monitoring schedule is presented on Table 4.3. The table describes the activities, indicates the scale of the effort (scope), denotes the nature of the funding and shows how the monitoring effort is linked to the 2002 Integrated List. The table also presents a timeline if the monitoring is multi-year.

Sublist 3 represents waters for which data are currently insufficient to properly assess the use support status. In many of these cases, new or additional data must be collected. In other instances, new assessment methods must be developed and these are discussed in this section. This section presents the status of sublist 3 reassessments as of the summer of 2002. The department is continually developing additional workplans and schedules through time to provide the necessary assessments to re-list these waters off of sublist 3, hence, much additional progress will most likely have been accomplished even as this report is finalized.

Table 4.3: Surface Water Quality Monitoring Schedule

**I.
ROUTINE/ONGOING**

MONITORING PROGRAM	DESCRIPTION	SCOPE	FUNDED TO	LINKAGE TO INTEGRATED LIST	COMMENTS	TIME LINE:				
Ambient Biomonitoring Network (AMNET)	single sampling performed on 5-yr rotating basis for benthic macroinvertebrates	freshwater, nontidal stream/rivers, 822 sites	funding based upon consistent ongoing commitment	Provides Aquatic Life Designated Use assessments for rivers and streams	Future modifications to protocol may reclassify AMNET sites on sublist 3	Round III: 7/02-11/02, 4/03-6/03: Upper Del Basin	7/03-11/03: No E Basin	4/04-11/04: Raritan Basin	4/05-11/05, 4/06-11/06, 4/07-6/07: Atlantic and Low Del Basins	7/07: Upper Del Basin
Warmwater Lake Fisheries Assessments	assessments of lake fisheries by Div. Of Fish Game and Wildlife.	fresh water lakes	funding based upon consistent ongoing commitment	provided assessments of Aquatic Life Designated Use attainment for lakes		2002: 3 lakes scheduled for assessment: Monksville Reservoir, DOD Lake, Shawsville Pond. Fieldwork to be completed by 11/02.	2003: 5 to 7 lakes will be assessed, to be selected from the "Warmwater Fisheries Management Plan"			
Fin-fish Integrated Biotic Assessment (IBI)	Assessment of fin-fish community structure	freshwater, nontidal stream/rivers in Northern NJ, aprox. 20 sites sampled per calendar year. Application to southern New Jersey under development.	funding based upon consistent ongoing commitment	currently not linked to 303d. See "Comments" Field	DEP is currently investigating how to integrate multiple biotic indicators	2000 & 2001 monitoring completed and reports generated	2002 Monitoring completed with 16 stations sampled (drought required curtailment of monitoring due to low stream flows)	2003 - Twenty stations projected to be sampled	2004 - Twenty new stations projected to be sampled. This will complete the first "round" of monitoring and will establish the North Jersey network.	2005 - Second round of monitoring will be initiated.
DEP/USGS Cooperative Ambient Network	Cooperative program between NJDEP and USGS. Quarterly sampling of sanitary/physical/chemical parameters plus chla.	freshwater, nontidal stream/rivers, 115 sites	funding based upon consistent ongoing commitment	general stream physical & sanitary quality	note: Sanitary monitoring = 5X in 30 days during May 1-Sept 30	Quarterly ea. yr.: Nov 1-Dec 15, Feb 1-Mar 15, May 1-June 15, Aug 1-Sept 15				

Table 4.3 continued

MONITORING PROGRAM	DESCRIPTION	SCOPE	FUNDED TO	LINKAGE TO INTEGRATED LIST	COMMENTS	TIME LINE:				
Supplemental Ambient Surface water Monitoring	Approximately 200 sites. Each site sampled quarterly for 2 years for physical/chemical parameters	Freshwater, largely nontidal stream/rivers, some tidal sites included. Represents supplemental monitoring covering locations not assessed in DEP/USGS network	Funded for 4 years, 3rd project yr. will begin as of 10/02	general stream physical/chemical quality	Formally termed the "Existing Water Quality Network" (EWQ)	Each site sampled quarterly ea. yr.: Jan 1-Mar 31, April 1-June 30, July 1-Sept 30, Oct 1-Dec. 31.	Beginning in Oct. 02 Monitoring will occur in WMAs 2, 4, 5, 7, 11, 13, 14, 15, 16, 17, 20.			
Diurnal Dissolved Oxygen Monitoring	Summertime diurnal dissolved oxygen monitoring performed on an "as needed" basis.	freshwater, stream/rivers, covers locations assessed in other networks as having known or suspected DO violations	varies year to year depending on available funding	nutrient enrichment and associated depressed DO in fresh waters	Goal of monitoring 20 stations per fiscal year.	Highly variable				
Watershed "Hot-Spot" Investigations	Quick response sampling to investigate water quality issues raised through one of the other routine monitoring programs	can occur anywhere statewide	No funding during FY03 for this activity.	used to confirm unusual sampling results or investigate issues raised by the Department or by watershed cooperators						
Shellfish Sanitation Monitoring	Monitoring of over 2,500 sites between 5 & 12 times per yr. In accordance with the National Shellfish Sanitation Program for sanitary quality in support of shellfish consumption	tidal rivers, back bays, estuaries, inlets and open ocean	funding based upon consistent ongoing commitment	provides assessment of shellfish consumption use attainment for coastal waters and source and cause assessments	sanitary surveys are conducted as part of the program to determine sources of bacterial contamination					
Marine and Estuarine Monitoring	quarterly sampling of 260 sanitary/physical/chemical parameters plus chl a	tidal rivers, back bays, estuaries, inlets and open ocean	funding based upon consistent ongoing commitment	provides assessment of Aquatic Life Use attainment (coastal waters)						

Table 4.3 continued

MONITORING PROGRAM	DESCRIPTION	SCOPE	FUNDED TO	LINKAGE TO INTEGRATED LIST	COMMENTS	TIME LINE:				
Cooperative Coastal Monitoring Program	Cooperative program between NJDEP, NJ Dept. of Health and Senior Services and local health agencies. Beaches are monitored for sanitary quality weekly between Memorial Day and Labor Day at 179 ocean beaches and 139 bay beaches	Ocean and bay bathing beaches	funding based upon consistent ongoing commitment	assesses recreational use attainment in ocean and bay bathing beaches	results of monitoring are used to open or close beaches to protect public health	performed annually during bathing beach season				
EPA Region II Helicopter Monitoring	Overflights sample ocean DO and temperature during the critical summer period (May through September).	10 eastward ocean transects from Sandy Hook to Cape May. Samples taken at 1, 3, 5, 7 & 9 mile points. NJ assesses the 1 & 3 mile stations; those within NJ's jurisdictional authority	funding based upon consistent ongoing commitment	provides assessment of Aquatic Life Use attainment for ocean waters based upon DO levels		performed annually during bathing beach season				
Sediment Toxicity Testing	Chronic toxicity test (14 day) performed on sediment from "severely impaired" AMNET sites		5 sites per yr.	Assess cause of impairment in severely impaired benthic macroinvertebrate sites (sites on sublist 5)						

Table 4.3 continued

II. SPECIAL STUDIES										
MONITORING PROGRAM	DESCRIPTION	SCOPE	FUNDED TO	LINKAGE TO INTEGRATED LIST	COMMENTS	TIME LINE:				
Cooper R/Pennsauken Cr TMDL monitoring	bacteriological monitoring to support TMDL	Sites Listed in 303(d) (sub-list 5)	To completion (10/02)	303(d) Fecal coliform violation in the 2 watersheds		Ongoing. Anticipated completion in 10/02.				
Rancocas Basin TMDL Monitoring	Sanitary monitoring under both high and low flow conditions to support TMDL	Sites Listed in 303(d) (sub-list 5)		303(d) Fecal coliform violations in the watershed (including the 3 sites currently listed)						
303(d) Heavy Metals Monitoring	High and low flow monitoring of a suite of metals	fresh water rivers and streams previously listed on NJ's 303(d) List for metals	funds currently sufficient to cover only limited high flow monitoring by EPA. Additional funding needed to complete high flow monitoring at all scheduled sites	Necessary to complete assessment of current ambient status of heavy metal listing in NJ's 303(d) List	Low flow monitoring completed	Low flow monitoring completed. Very limited high flow work ongoing due to lack of funding				
New Fish Tissue Monitoring	Fish and shellfish species currently under consumption advisories will be collected and analyzed for organochlorinated pesticides, dioxin/furan and mercury.	Sampling will be conducted statewide over a period of 5 years and includes freshwater rivers, lakes, estuaries and marine waters.	Funded to end of 02. Funding for 03 under consideration. Later years not yet under discussion	Updates body burden status of all fish tissue consumption advisories statewide for organochlorinated pesticides, dioxin/furan and mercury		2002 (year 1) Passaic River Region - ongoing	2003: Raritan River Region	2004: Atlantic Coastal Region	2005: Delaware River Region, 2006: Marine and Estuarine Regions	

Table 4.3 continued

MONITORING PROGRAM	DESCRIPTION	SCOPE	FUNDED TO	LINKAGE TO INTEGRATED LIST	COMMENTS	TIME LINE:				
Algal Biostimulation Assessments	Assessment of phosphorus as limiting nutrient at selected sites. Note: this methodology is still undergoing development	freshwater rivers and streams listed in 303(d) for Total Phosphorus	funded through 2003. Expected funding for 16 sites in 2004.	assess phosphorus as limiting nutrient in waters listed on 303(d) for phosphorus	methodology is still undergoing development					
Round Valley/Spruce Run Monitoring	Water quality assessment of the reservoirs in relation to the water withdraws and resulting water level fluctuations	limited to the two reservoirs.	Funding to be provided by State Treasurer on as need basis.	Spruce Run Reservoir is on the 303(d) List due to an impaired fishery brought about by frequent and significant water withdrawals	Required by State law	Monitoring to be conducted as necessary to establish impacts to both reservoirs from withdrawal and pump-up.				

Monitoring and Assessment Schedule for Waters on Sublist 3 of the 2002 Integrated List

The waterbodies currently listed on sublist 3 of the Integrated List can be subdivided into 5 categories:

1. Benthic macroinvertebrate sites from pinelands waters and those delineated as “unique.”
2. Eutrophic lakes assessed by *Lake Water Quality Assessment Reports* or *Lake Intensive Surveys* for which the Department has no use impairment information.
3. DEP-USGS Ambient Stream Monitoring Network (Statewide Status Sites) possessing insufficient data to support full assessments.
4. Selected metal listings.
5. A limited selection of coastal shellfish sites.
6. Sanitary assessments for the NJ-NY Harbor waters within New Jersey’s jurisdiction.
7. Two recreational lakes for which bathing beach status is unclear.

NJDEP’s plan to reassess sublist 3 waters for reassignment to one of the other four sublist categories within the Integrated List is as follows.

1. Reassessment Of Benthic Macroinvertebrate Sites Assigned To Sublist 3 Of The Integrated List

The Department is exploring both short and long term assessment methods. Short term methods would be put into place relatively quickly, use existing data and allow a reassessment of some portion of the sublist 3 waters. These short term efforts would eventually give way to longer term methods which would require metric development or a some significant change in protocol and may require several years to develop.

Pinelands (PL) Waters

Short-term assessment: DEP is considering the use of finfish assessments by Pinelands Commission to isolate background (undisturbed) PL sites from sites displaying obvious anthropogenic disturbance.

Long-term: use of multi-metric assessment method applied to macroinvertebrates if possible. Sampling in support of this approach is anticipated to be completed at the end of 2002. This will be followed by the development and evaluation of assessment metrics. Metric development (DEP in cooperation with EPA Region II) is anticipated to take possibly 2 years.

Assessment of Headwaters Stream (watershed less than 6 sq. mi.):

Short term: a combination of *weight of evidence* possibly combined with an *indicator species approach*. Weight of evidence takes into account the condition of neighboring sites, surrounding landuse and relies on a preponderance of evidence as to whether the existing assessment is supported or should be called into question. The indicator species approach looks at the community of a site for the presence of pollution intolerant organisms. Towards this end, NJDEP and USGS are looking at the possibility of applying multivariate methods to explore the statistical certainties of the indicator species approach to categorizing headwater streams.

Long Term: Develop new macroinvertebrate metrics to be applied to headwaters. No states or EPA Regions have developed headwater metrics as yet. EPA Region II is assisting by investigating work directed towards the assessment of headwaters by other investigators.

Sites Immediately Downstream of Impoundments:

Sites will be re sampled either upstream of the impoundment, or further downstream of the lake, out of its zone of influence.

2. Eutrophic lakes assessed by Lake Water Quality Assessment Reports or Lake Intensive surveys for which the Department has no information indicating Use Impairment.

The Department does not currently have a lakes monitoring program. There are, however, discussions as to the feasibility of developing a program for public lakes. If such is developed, lakes listed on sublist 3 could be prioritized for use support status assessments.

3. DEP-USGS Ambient Stream Monitoring Network sites (Statewide Status Sites) possessing insufficient data to support full assessment.

Statewide Status Sites are designed to support statewide probabilistic water quality assessments. Annually, 40 stations were selected randomly from a network of over 800 AMNET locations and monitored quarterly for one year. Many of these sites had insufficient data for water quality assessments and were placed on sublist 3. The Department's response to these listings is to continue to amass data from this network in a stratified random manner until enough is collected sufficient to support a stratified probabilistic assessment as to the statistical probability of a particular site being impaired or not impaired.

At this time, NJDEP has many response options that have yet to be discussed. The Department might use the strength of the probabilistic assessment to decide that a location has a high likelihood of being impaired and schedule the location (as a high priority) to for intensive water quality investigations to confirm their status. Those locations possessing low statistical likelihood of being impaired might be assumed to be unimpaired or perhaps be scheduled for low priority follow-up assessment to confirm their status. These and other possible responses will be discussed within the Department in the months ahead.

4. Metal listings:

- a. Sites previously listed in 303(d) for which current monitoring (high and low flow) reveals no detection of the metal, however, the metal criterion is below the method detection limit (MDL) for the analysis currently employed.**
- b. Sites not previously listed in 303(d) for which new data (low and high flow) do not exceed any criteria but the criteria is below the MDL (and/or) if only low flow data is available and does not exceed any criteria. High flow data is still pending.**

Certain metals such as arsenic, mercury, and cadmium have criteria in NJ's Surface Water Quality Standards that are below the method detection limit (MDL) for the laboratory analysis currently employed by NJDEP and USGS. For these sites on sublist 3, current sampling has detected no metals. However, to ensure that there are no exceedances above the criteria, more sensitive analytical methods with lower MDLs (at or below these criteria) will need to be employed. The Department is currently discussing various analytical options with the USGS that could be applied to the Ambient Stream Monitoring Network (ASMN) in order to significantly lower the current levels of detection for these selected metals.

For sites not previously listed on 303(d), where low flow data are acceptable, but high flow data has yet to be collected; the Department will make every effort to ensure timely collection of high flow data in order to complete the metal assessments.

Coastal Shellfish Sites

The sanitary fitness of two regions for the support of shellfish harvesting, the Cape May Canal and in a region running from Cherry Tree Creek to Artificial Island, are currently unclear. Cape May Canal was listed based solely on land use and not collected data. The Cherry Tree Creek has not been monitored since the 1970's and has been classified as Special Restricted ever since. The status of both regions is expected to be clarified with new data within the near future.

5. Sanitary assessments for the NJ-NY Harbor waters contained within New Jersey's jurisdiction

The most recent 5 years of Interstate Environmental Commission (IEC) data did not reveal violations the SWQS for recreation designated use. This was not surprising as there has been considerable improvement to the sewerage infrastructure since the listing of these waterbodies in the 1980's. In consideration of the recent data, the Department was considering delisting these waterbodies, however, decided to place them on sublist 3 rather than sublist 1. The stations used in the assessment (and to list the waterbodies originally) are located in the mid-channel of the waterbodies in question and these locations, while serving to provide a good overview of general water quality, do not reflect conditions near the shore line where most secondary recreation occurs. The Department also questioned whether the mid-channel stations would accurately reflect water quality near the shoreline which may be influenced by CSO flows. In view of this, the waterbodies were placed on sublist 3. NJDEP plans to work with the IEC to modify their sampling plan and conduct additional monitoring to insure that near-shore waters also meet the SWQS for fecal coliform.

8. Two recreational lakes for which bathing beach status is unclear

In these cases the beaches were either closed or data were not provided. This represents Wood Lake in Medford Township and Sachaawea Camp on Gorden Lake in West Millford Township. The Department will work with the New Jersey Department of Health and Senior Services (NJDHSS) and the Department's Cooperative Coastal Monitoring Program to obtain assessment for the lakes in question.